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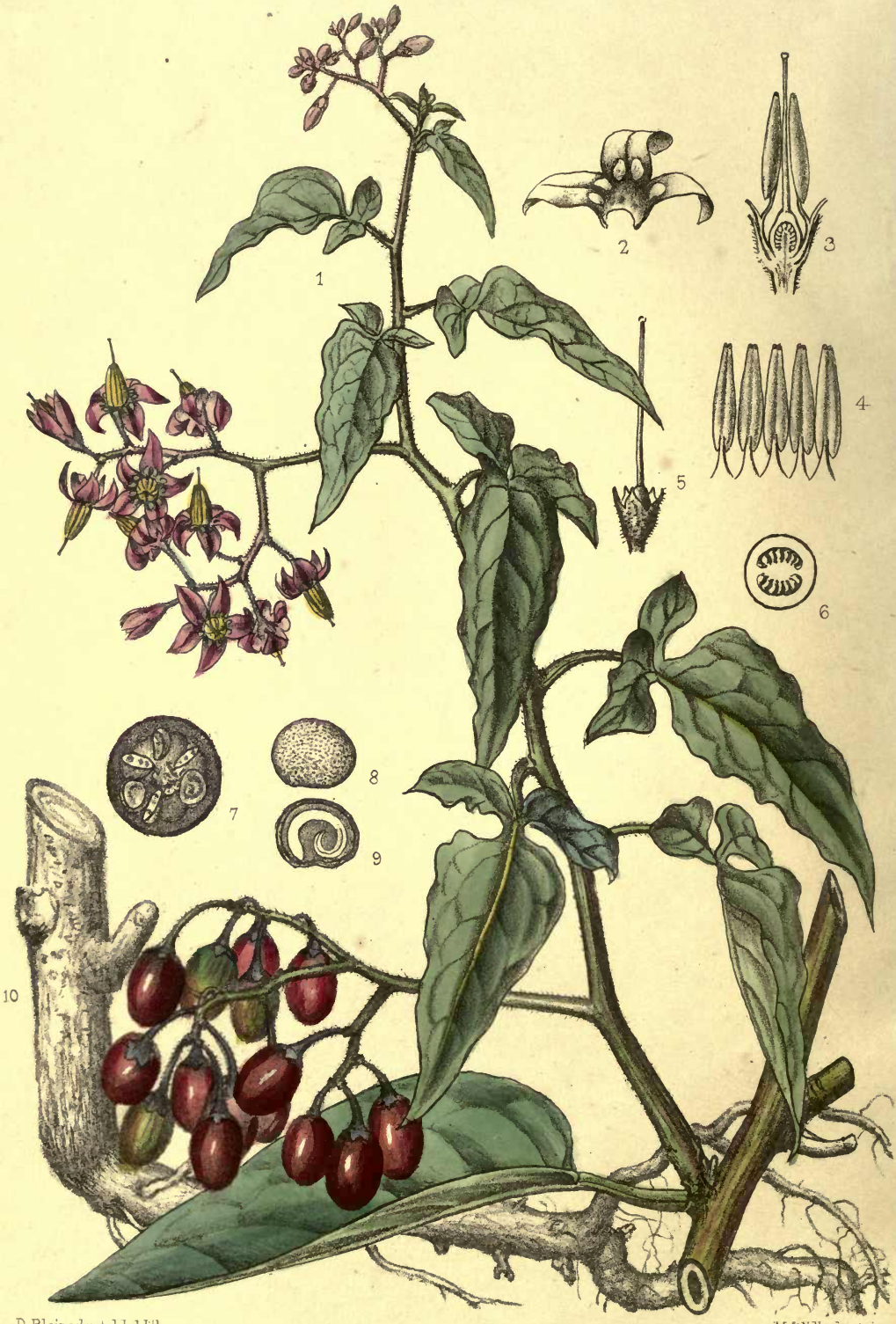


D. Blair ad nat. del. et lith.

M & N. Hanhart, imp.

SOLANUM DULCAMARA, *Linn.*

N. Ord. SOLANACEÆ.

Tribe *Solaneæ*.

Genus Solanum,* *Linn.* (emend.) Dunal in DC. Prod., xiii (1852), pp. 27—387. One of the largest known genera, containing about 1000 species, for the most part tropical and S. American.

190. Solanum Dulcamara,† *Linn., Sp. Pl. ed.* 1, *p.* 185 (1753).

Bitter-Sweet. Woody Nightshade.

Syn.—Dulcamara flexuosa, *Moench.*

Figures.—Woodville, t. 85; Steph. & Ch., t. 17; Bigelow, i, t. 18; Hayne, ii, t. 39; Nees, t. 188; Berg & Sch., t. 20 b; Curt., Fl. Lond., fasc. i; Syme, E. Bot., vi, t. 930; Reich., Ic. Germ., xx, t. 1633.

Description.—A climbing shrub, reaching, when supported by other plants, many feet in height. Rootstock woody, widely creeping, irregular, branched, pale yellow. Stem woody at base, dying far back in the winter, much branched, hollow, wood soft, bark greyish yellow; branches flexuose, weak, green, glabrous or pubescent. Leaves alternate, stalked, 2 or 3 inches long; the lower ones ovate, usually cordate at the base, the upper ones hastate or auricled, or even with two nearly separate leaflets at the base, margin entire, usually pubescent beneath. Inflorescence consisting of stalked corymbose cymes of 10—20 flowers, projecting at right angles from one side of the stem, extra-axillary, longer than the leaves; flowers stalked, pedicels slender, tapering downwards, downy or hairy, purple, divaricate, surrounded at the base by a cup-shaped projection of the axis, ebracteate. Calyx small, 5-lobed. Corolla deeply cut into 5 lanceolate acute segments, lurid purple, each with two green spots at the base, spreading or reflexed. Stamens 5, filaments very short, triangular, inserted on

* The Latin equivalent of the Greek *στρύχνον*, applied to several plants.

† *Dulcis*, sweet, *amarus*, bitter. It was also called by the mediæval botanists *Amara dulcis* and *γλυκύπικρον*—words with the same signification as the English Bitter-sweet.

the tube of the corolla; anthers large, bright yellow, cohering to form a projecting conical tube round the style which protrudes beyond it, each opening by 2 small terminal pores. Ovary 2-celled, with numerous ovules attached to the axis; style simple. Berries drooping, red, semi-transparent, about ½ an inch long, ovoid, skin thin; seeds numerous, immersed in red pulp, pale yellow, the surface very minutely pitted with indentations with sinuous walls; embryo strongly curved, and surrounded by abundant endosperm.

Habitat.—This beautiful plant is a well-known and abundant ornament of our hedges, especially if bordered by a ditch, it being one of those species which luxuriate in the close proximity of water, though in no way an aquatic plant. It becomes more scarce in Scotland, and runs out northwards in Aberdeen and Argyle. About London it is a very common plant, and is one of the last to linger in the outskirts of the town. Out of England it has a wide distribution throughout Europe, except the extreme north, and through Western Asia to North-West India and China; it also occurs wild in Northern Africa and Asia Minor, and is naturalized in many parts of North America. It is sometimes found with white flowers.

Dunal in DC. l. c., p. 78; Syme, E. Bot., vi, p. 95; Hook. f., Stud. Fl., p. 256; Watson, Comp. Cyb. Br., p. 252; Gren. & Godr., Fl. France, ii, p. 544; A. Gray, Man. Bot. U. S., p. 339. Lindl., Fl. Med., p. 511.

Official Part and Name.—DULCAMARA. The dried young branches; from indigenous plants which have shed their leaves (B. P.)—The dried young branches (*Dulcamara*); collected after the plants have shed their leaves (I. P.)—DULCAMARA. The young branches (U. S. P.)

General Characters and Composition.—For medicinal use the young branches are cut into short lengths, and dried. These pieces are light, usually about the thickness of a goose-quill, nearly cylindrical in form, and of an ash-grey colour. When fresh they have a peculiar and unpleasant odour, which they lose in a great measure by drying. Their taste is at first slightly bitter, and afterwards sweetish; hence the origin of the common name *bitter-*

sweet which is given to the plant. They consist of a thin shining bark surrounding the wood, which is lined internally by a whitish pith, but as this only partially fills the axis the centre is hollow.

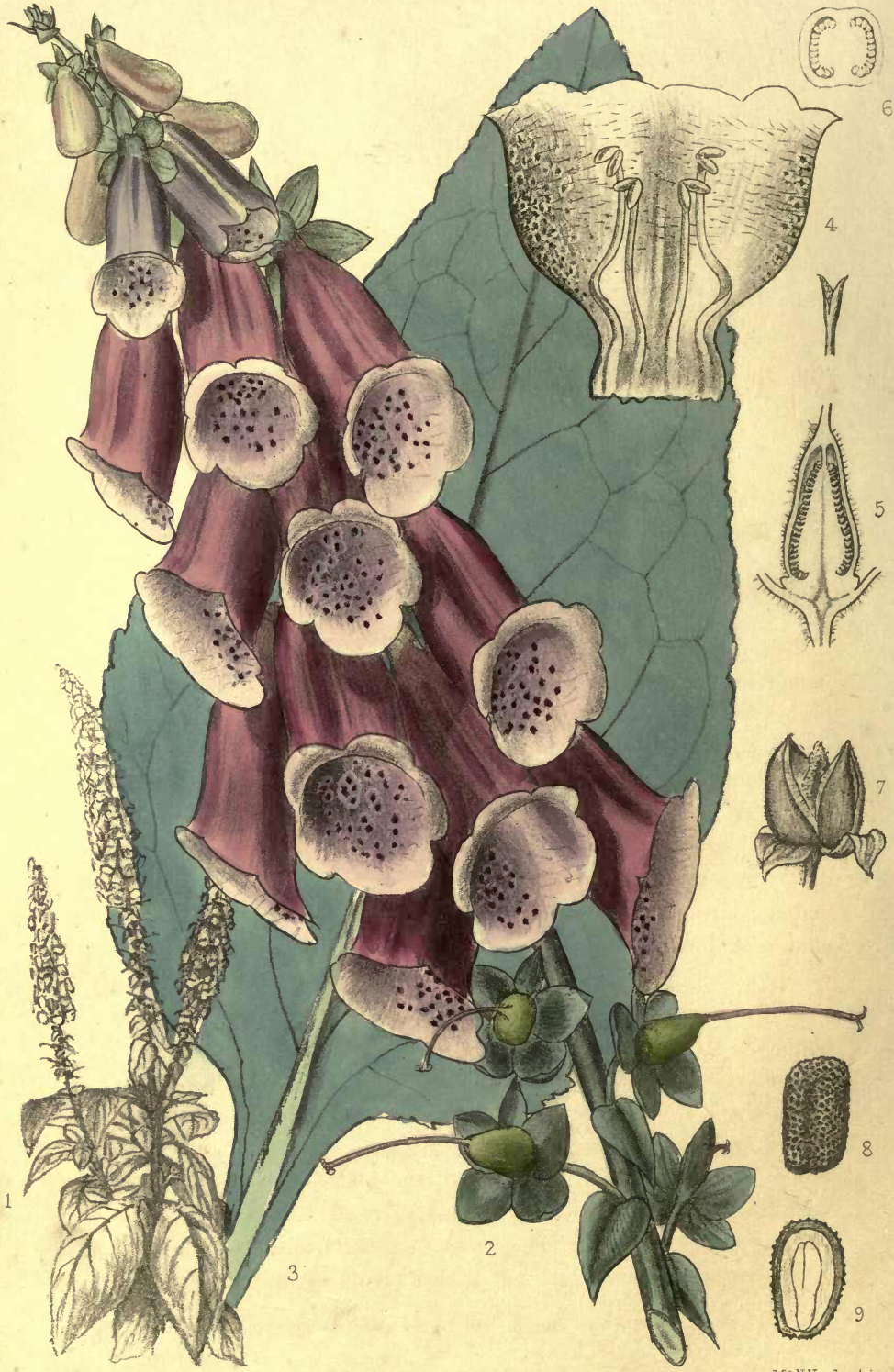
The composition of dulcamara has been variously given by different chemists. The taste is said to be due to a bitter principle, which yields by decomposition an alkaloid *solania*, and *sugar*. A bitterish-sweet, amorphous alkaloid, called *dulcamarine* or *picroglycion* has also been obtained from dulcamara by Winckler.

Medical Properties and Uses. — The action of dulcamara is unknown. Garrod states that it does not dilate the pupils or produce dryness of the throat like belladonna, henbane, or stramonium, but it seems to act on the skin and kidneys. It is reputed to operate as a diuretic and diaphoretic, and in excessive doses as an acro-narcotic poison. It has been thought serviceable in chronic pulmonary catarrh, in chronic rheumatism, in some obstinate skin diseases, as lepra, eczema, and psoriasis, and in cachectic cases, in which sarsaparilla has been found beneficial. Waring states that with fresh Hemidesmus root at hand the practitioner in India is independent of this article. In this country it is but very little esteemed, and several physicians have given the preparations of dulcamara in very large doses without any obvious effects.

Pereira Mat. Med., vol. ii, part 1, p. 592; Pharmacographia, by Flückiger and Hanbury, p. 405; United States Dispensatory, by Wood and Bache, p. 370; Garrod, Essentials of Materia Medica, 1868, p. 285; Pharmacopœia of India, p. 179.

DESCRIPTION OF PLATE.

Drawn from a specimen gathered in the Regent's Park, London. 1. A branch of the year with flowers and fruit. 2. Half of the corolla. 3. Vertical section through ovary. 4. The stamens flattened out. 5. Calyx with pistil. 6. Transverse section of ovary. 7. Ditto of berry. 8. Seed. 9. Section of the same. (2—7 enlarged; 8, 9 much magnified.)



D. Blair ad nat del et lith.

M&N Hanhart imp.

DIGITALIS PURPUREA, *Linn.*

N. Ord. SCROPHULARIACEÆ. Lindl., Veg. Kingd., p. 681; Le Maout & Dec., p. 583.

Tribe *Digitaleæ*.

Genus Digitalis,* *Linn.* Lindley, Monogr., Gen. Digit. (1822); Benth. in DC. Prod., x, pp. 449—453. Species about 18 or 20, natives of Europe and Central Asia.

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195. Digitalis purpurea, *Linn., Sp. Pl. ed.* 1, *p.* 621 (1753).

Foxglove.

Syn.—D. tomentosa, *Link & Hoffm.*

Figures.—Woodv., t. 78; Steph. & Ch., t. 18; Hayne, i, t. 45; Nees, t. 154; Berg & Sch., t. 21 b; Curt., Fl. Lond., fasc. i; Syme, E. Bot., t. 952; Reich. Ic. Germ., xx, t. 1688; Lindl., Monogr., t. 2.

Description.—A tall herbaceous biennial (or perennial ?). Root of numerous long thick fibres. Stem upright, from 2 to 7 or more feet high, solitary or several, simple or slightly branched; branches erect, round, closely downy. Radical leaves very large, often a foot or more long, contracted at the base into a long, winged petiole, ovate, subacute, irregularly crenate-dentate, somewhat rugose, slightly hairy and dull green above, densely pubescent and grey beneath; the upper ones becoming gradually narrower and more shortly stalked, and at length passing into the sessile bracts. Inflorescence a much elongated terminal raceme, the pedicels spreading, and, like the rachis, closely pubescent; flowers large, numerous (often 60 or 70), closely placed, overlapping, pendulous, unilateral. Calyx divided almost to the base into 5 acute spreading segments, the uppermost one smallest, all pulverulent. Corolla 1½—2½ inches long, tubular-bell-shaped, flattened above, inflated beneath, suddenly contracted into a cylindrical base, obscurely 2-lipped, the upper entire or faintly bilobed, somewhat recurved, the lower distinctly 3-lobed with the central one much the longest, crimson outside above, paler beneath, the lower lip furnished with long hairs inside, and marked with dark crimson spots, each surrounded with a white border.

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* From *digitale*, the finger of a glove.

Stamens 4, arising from the base of the corolla, and entirely included in it; filaments thick, the two lower kneed, longer than the upper; anthers 2-celled, cells diverging. Ovary conical, 2-celled; ovules numerous; placentas large, spongy, axile; style filiform, shortly bifid. Capsule ovoid, acuminate, about $\frac{5}{8}$ths of an inch long; pericarp thin, papery, splitting septicidally into 2 valves, which also separate from the axis; seeds abundant, minute, oblong or ovoid, cylindrical, light brown, deeply alveolate; embryo straight in axis of endosperm.

Habitat.—Perhaps the handsomest of our indigenous plants, and common in most parts of the country on dry sandy or gravelly soils in open woods, heaths, and hedgebanks, making a great show in places where it is abundant; in perfection in July. It is curiously absent from a few of the eastern counties, for example, Cambridgeshire. It grows in most parts of Europe, but is entirely absent from some calcareous districts, *e. g.* the chain of the Jura; it also occurs in Madeira and the Azores, but is perhaps introduced there.

Benth. in DC. Prod., x, p. 451; Syme, E. Bot., vi, p. 127; Hook. f., Stud. Fl., p. 266; Wats., Comp. Cyb. Br., p. 262; Gren. & Godr., Fl. France, ii, p. 602; Lindl. Fl. Med., p. 502.

Official Part and Name.—DIGITALIS FOLIA. The dried leaf; collected from wild indigenous plants when about two thirds of the flowers are expanded (B. P.)—The leaves (*Digitalis Folia*); gathered when about two thirds of the flowers are expanded (I. P.)—DIGITALIS. The leaves; from plants of the second year's growth (U. S. P.)

Collection.—The leaves are directed to be gathered when about two thirds of the flowers are expanded, because at this time, that is, before the ripening of the seeds, they are in the most active state. The reason of this may be explained as follows:—There are two series of compounds formed by the action of light and air in plants, those of one series having for their object their nutrition, and being therefore directly concerned in their growth and development, and those of the other series, called secretions, playing no active part in plants after their perfect formation, and

being also commonly formed later in their life. In the process of flowering the only compounds that are taken up in any amount are those which are concerned in the growth and development of new tissues; no further growth can therefore take place (to any great extent at least), in the vegetative organs of a plant, after the flowering stage has commenced; but the secretions by the removal of these nutritive products become more concentrated, and the organs in which they are produced, by being left for a longer period in connection with the plant, have time to elaborate them more perfectly.

The leaves should be collected in the second year of the plant's growth, as directly stated in the United States Pharmacopœia, and also implied in the directions of the British and Indian pharmacopœias, as the plant does not flower till the second year. But the first year's leaves are frequently substituted for those of the second year's growth; as are also the leaves of *Inula Conyza*, DC., Ploughman's Spikenard, and those of *Symphytum officinale*, Linn., Comfrey, *Verbascum Thapsus*, Linn., Mullein, and other plants; and as these are sometimes not readily distinguished from the official leaves, it is better for pharmacists to purchase the fresh plant when in flower, which can scarcely be mistaken for any other, and strip and dry the leaves for themselves.

General Characters and Composition.—The botanical characters of the fresh leaves have been already given. When bruised, they have an unpleasant herbaceous odour; but when dried their odour is agreeable, and resembles tea. The dried leaf has a very bitter taste. *Digitalis seeds* were formerly official, and are by some preferred to the leaves.

Digitalis leaves and seeds contain a non-nitrogenised neutral principle called *digitalin*, to which their properties are essentially due; but this name has been applied by chemists to widely different substances, both crystalline and amorphous, but what relation these substances have to one another, as well as their respective physiological actions, are questions yet to be solved. The digitalin which is official in the British, Indian, and United States pharmacopœias, as well as in the French Codex, is the *Digitalin*

of Homolle. One hundred parts of dried leaves yield about 1·25 of this digitalin.

Medical Properties and Uses.—Digitalis is a very powerful drug, acting especially as a sedative of the heart's action, and also as a diuretic. Digitalin also produces effects similar to those of digitalis leaves, but the experiments of Homolle, Bourchardat, and Sandras show that it is at least one hundred times as powerful as the powder of the dried herb. Much care is necessary in the administration of digitalis, and more especially so of digitalin, as the latter is a very powerful poison. Digitalis also acts as an acro-narcotic poison in large doses, and even when administered in small doses for a length of time, it is liable to accumulate in the system, and to manifest its presence all at once by its poisonous action. Hence the action of digitalis in all the forms in which it is administered should be carefully watched. Digitalis is a powerful and valuable remedy in dropsy, especially when this is connected with affections of the heart. In some heart diseases it is also a most effectual remedy in reducing the force and velocity of the circulation. It has also been employed in fever, in various inflammatory diseases, in delirium tremens, with marked success in large doses, frequently repeated, in acute mania, spermatorrhœa, epilepsy, croup, hæmoptysis, menorrhagia and other forms of uterine hæmorrhages, and in various other diseases, with real or supposed benefit. Digitalin has similar uses to digitalis; it is reputed to be a powerful anaphrodisiac.

Ph. Jl., 2nd ser., vol. iii, p. 475; Per. Mat. Med., by Bentley and Redwood, p. 588; Pharmacographia, p. 423; U. S. Disp., by W. and B., p. 361; Gar. Mat. Med., 1868, p. 296; Per. Mat. Med., vol. ii, part 1, pp. 523, and 528—537.

DESCRIPTION OF PLATE.

Drawn from a specimen in the R. Botanic Soc.'s Garden, Regent's Park. 1. Plant (reduced). 2. Summit of raceme. 3. Radical leaf. 4. Corolla laid open from below. 5. Summit of style and vertical section of ovary. 6. Transverse section of the ovary. 7. Capsule burst and the seeds fallen. 8. A seed. 9. Section of same. (5 and 6 enlarged; 8 and 9 highly magnified.)

D. Blair ad nat. del. et lith.

M&N Hanhart imp.

MENTHA VIRIDIS, *Linn.*

N. Ord. LABIATÆ.
Tribe *Satureieæ*.
Genus Mentha, *Linn.*

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202. Mentha viridis, *Linn., Sp. Plant, ed. 2, p.* 804 (1762).

Spear Mint. Common Garden Mint. Mackerel Mint.

Syn.—M. sylvestris, var. glabra, *Koch.* M. spicata, *Crantz.*

Figures.—Woodville, t. 121 ?; Steph. & Ch., t. 45; Nees, t. 166; Hayne, xi, t. 36; Sole, Brit. Mints, t. 5; Syme, E. Bot., vii, t. 1023; Reich., Ic. Germ., xviii, t. 1284, fig. 1.

Description.—Rootstock perennial, with elongated suckers. Stems herbaceous, 2—3 feet or more high, erect, acutely quadrangular, with erect-patent, opposite branches, smooth or very slightly hairy, often tinged with bright purple. Leaves opposite, sessile, or the lowest very slightly stalked, lanceolate or oblong-lanceolate, 2—4 inches long, rounded at the base, acute at the apex, dark green, serrate, smooth on both surfaces, or slightly hairy on the veins below, paler and thickly glandular beneath. Inflorescence of numerous spikes of verticils terminating the stem and branches; spikes narrow, acute, elongated, with numerous distinct whorls, the lower ones considerably separated; flowers small, on perfectly smooth pedicels; bracteoles linear, subulate, slightly fringed. Calyx nearly regular, bell-shaped, cylindrical, 10-ribbed, purplish, dotted with glands, quite smooth, 5-toothed, the teeth lanceolate-subulate, as long as the tube, ciliate. Corolla about twice the length of the calyx, pale purple, naked within and without. Stamens 4, included or exserted, filaments equal. Style exserted, bifid at apex. Achenes smooth.

Habitat.—The common mint is a well-known garden plant, and is in all probability a cultivated race of *M. sylvestris*, L. (Horse-mint), a coarse woolly plant of wide distribution. It has been in cultivation in England for many centuries, and occurs occasionally here in a semi-wild state. Mr. Baker considers it truly indi-

genous in the north of England. It also grows in kitchen gardens in most parts of Europe, Asia, and the Cape of Good Hope, North and South America, &c., and is cultivated for medicinal purposes at Mitcham, Surrey, and in the United States. It flowers in August and September, and is sometimes found with crisped leaves.

Smith, E. Fl., iii, p. 75; Baker in Journ. Bot., 1865, p. 239; Syme, E. Bot., vii, p. 7; Hook. f., Stud. Fl., p. 279; Gren. & Godr., Fl. Fr., ii, p. 649; Benth. in DC., l. c., p. 168; Lindl. Fl. Med., p. 486.

Official Parts and Names.—Oleum Menthæ Viridis. The oil distilled in Britain from fresh flowering spearmint (B. P.)—The oil (*Oleum Menthæ viridis*), obtained by distillation from the fresh herb when in flower (I. P.)—Mentha Viridis. The leaves and tops (U. S. P.)

General Characters and Composition.—The botanical characters of the herb have been already given. It has a strong aromatic peculiar odour, and a warm slightly bitter taste resembling that of peppermint, but less pungent, and to many more agreeable. These properties are somewhat less marked in the dried herb, but are retained for a long time. The medicinal virtues of the plant essentially reside in the official oil of spearmint. This oil is colourless, pale yellow, or greenish when recently prepared, but it becomes red by age. It has the odour and taste of the herb; it has a specific gravity of 0·914, and boils at 320°. According to Gladstone, it consists of a hydrocarbon almost identical with oil of turpentine mixed with an oxidised oil, to which is due the peculiar smell of the plant.

Medical Properties and Uses.—The medical properties of spearmint are similar to, although feebler than, peppermint. These are aromatic, carminative, mildly stimulant, and stomachic. The oil is carminative and stimulant, and is also used as a flavouring ingredient. Spearmint water possesses similar properties, but is chiefly used as a vehicle for other medicines. Spearmint is also frequently employed for culinary purposes; and the oil is used

in the United States as a perfume by soap manufacturers, and as a flavouring agent, &c., by confectioners.

Per. Mat. Med., vol. ii, part 1, p. 510; U. S. Disp., by W. and B., pp. 560 and 1310; Pharmacographia, p. 431; Stephenson and Churchill's Medical Botany, by Burnett, vol. i, pl. 45.

DESCRIPTION OF PLATE.

Drawn from a plant grown in the Royal Botanic Society's Garden, Regent's Park, London.

1. A flower.
2. Corolla cut open.
3. Vertical section through calyx and ovary.

(1—3 enlarged.)

D. Blair ad nat. del. et lith.

M & N Hanhart imp

MENTHA PIPERITA, *Sm.*

N. Ord. LABIATÆ.
Tribe *Satureieæ*.
Genus Mentha.

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203. Mentha piperita, *Smith in Trans. Linn. Soc., vol.* V (1800), *p.* 189. (*non Linn.*)

Peppermint.

Syn.—M. officinalis and M. hircina, *Hull.* M. piperita, var. officinalis, *Koch.* M. viridi-aquatica, *F. Schultz.*

Figures.—Woodv., t. 120; Steph. & Ch., t. 45; Nees, t. 163?; Hayne, xi, t. 37; Berg & Sch., t. 23 c; Sole, Brit. Mints, tt. 7 and 8; Syme, E. Bot., vii, t. 1024, 1025.

Description.—A perennial herb, with a rootstock which gives off long suckers. Stems erect or nearly so, 3—4 feet high, square, smooth or slightly hairy, green or purplish, branched at the base; branches long, spreading. Leaves all stalked; petioles of the lower ones ½ an inch or more long, of the upper shorter; leaves dark dull green above, paler and covered with minute glands beneath, smooth or nearly so, lanceolate, oval or ovate, varying in width, sharply serrate, the base narrowed or rounded, the apex acute. Inflorescence composed of several whorls, forming a terminal, loose, conical spike, the whorls separated below; lower bracts leaf-like, apex of spike pointed or rounded; flowers shortly stalked; pedicels smooth, purplish, glandular; bracteoles lanceolate, acuminate, slightly fringed. Calyx cylindrical, campanulate, glabrous, dotted with glands, purple; the teeth triangular, cuspidate, half as long as the tube, ciliate. Corolla about twice as long as calyx, pale purplish red, glabrous inside and out, upper lip emarginate. Stamens 4, filaments short, equal, included. Style exserted, bifid at its extremity. Achenes smooth or rugose.

Peppermint is readily recognised from spearmint by its uniformly stalked leaves, thicker and more crowded inflorescence, larger flowers, and shorter calyx-teeth, as well as by the familiar warm pungent odour and taste. It presents two forms, distin-

guished as var. *officinalis* (*M. piperita,* Huds.), with narrower leaves and more elongated spikes, and var. β. *vulgaris* (*M. piperita,* Hull) with broader leaves more rounded at the base, and with spikes more blunt and close; but many specimens are intermediate in character, as was the case in the one figured. It is probably correct to regard the plant as a cultivated race of the common water mint, *M. hirsuta,* Linn., with which var. β is indeed connected by numerous intermediate forms.

Habitat.—It is doubtful whether *M. piperita* is anywhere known truly wild, but it is recorded from watery places in many parts of England and Scotland, extending as far north as Forfarshire and Inverness-shire, flowering in August and September. It is difficult to trace its distribution out of England; but it occurs in many parts of Europe, Asia and North America, under similar conditions to those under which it exists in this country. It is extensively cultivated for medicinal use at Mitcham, Surrey, and in Lincoln, Cambridge and Herts (Hitchin). At the first-named place two kinds are recognised, and we are indebted to Dr. Piesse, of New Bond Street, for specimens of the "black" and "white" mints of the Mitcham fields. The former is a much coarser plant than the latter, and is more tinged with purple; it also flowers somewhat later, and the oil it affords, though more abundant, is less valued; there are no botanical characters to separate the plants. Peppermint is also grown on a large scale in America, and in France, Germany and Southern India.

Sm., E. Fl., iii, p. 76; Baker in Journ. Bot., 1865, p. 240; Syme, E. Bot., vii, p. 9; Watson, Comp. Cyb. Br., p. 268; Hook. f., Stud. Fl., p. 279; Benth. in DC., l. c., p. 169; Lindl. Fl. Med., p. 487.

Official Parts and Names.—Oleum Menthæ Piperitæ. The oil distilled in Britain from fresh flowering peppermint (B. P.)—The oil (*Oleum Menthæ piperitæ*), obtained by distillation from the fresh herb when in flower (I. P.)—Mentha Piperita. The leaves and tops (U. S. P.)

General Characters and Composition.—The botanical characters of the herb have been described above. Peppermint is more pungent than any of the other mints. The herb both in a fresh

and dried state has a peculiar, aromatic, and agreeable odour, and an aromatic, warm, burning, bitterish taste, followed by a sensation of coolness when air is drawn into the mouth. The properties of the herb depend essentially upon the official oil of peppermint. This oil is colourless, pale yellow, or greenish when recent, but like the oil of spearmint it becomes reddish by age. Its sp. gr. varies from 0·84 to 0·92. It has a powerful penetrating aromatic taste, like that of the herb, followed by a sensation of cold, and a strong agreeable odour. Oil of peppermint consists of two substances, one fluid, the other solid; the chemical nature of the former has not been determined; the latter, which is sometimes deposited from oil of peppermint, when it is subjected to a cold of about 8° below the zero of Fahrenheit, in the form of colourless hexagonal crystals, is called *menthol* or *peppermint camphor*. Its proportion varies much in different oils. The so-called Chinese oil of peppermint of commerce is distilled at Canton from *Mentha javanica*, Bl. It is pure crystallised menthol. Oil of peppermint upon long standing also deposits a solid crystalline portion, which is commonly termed the Stearoptene of oil of peppermint.

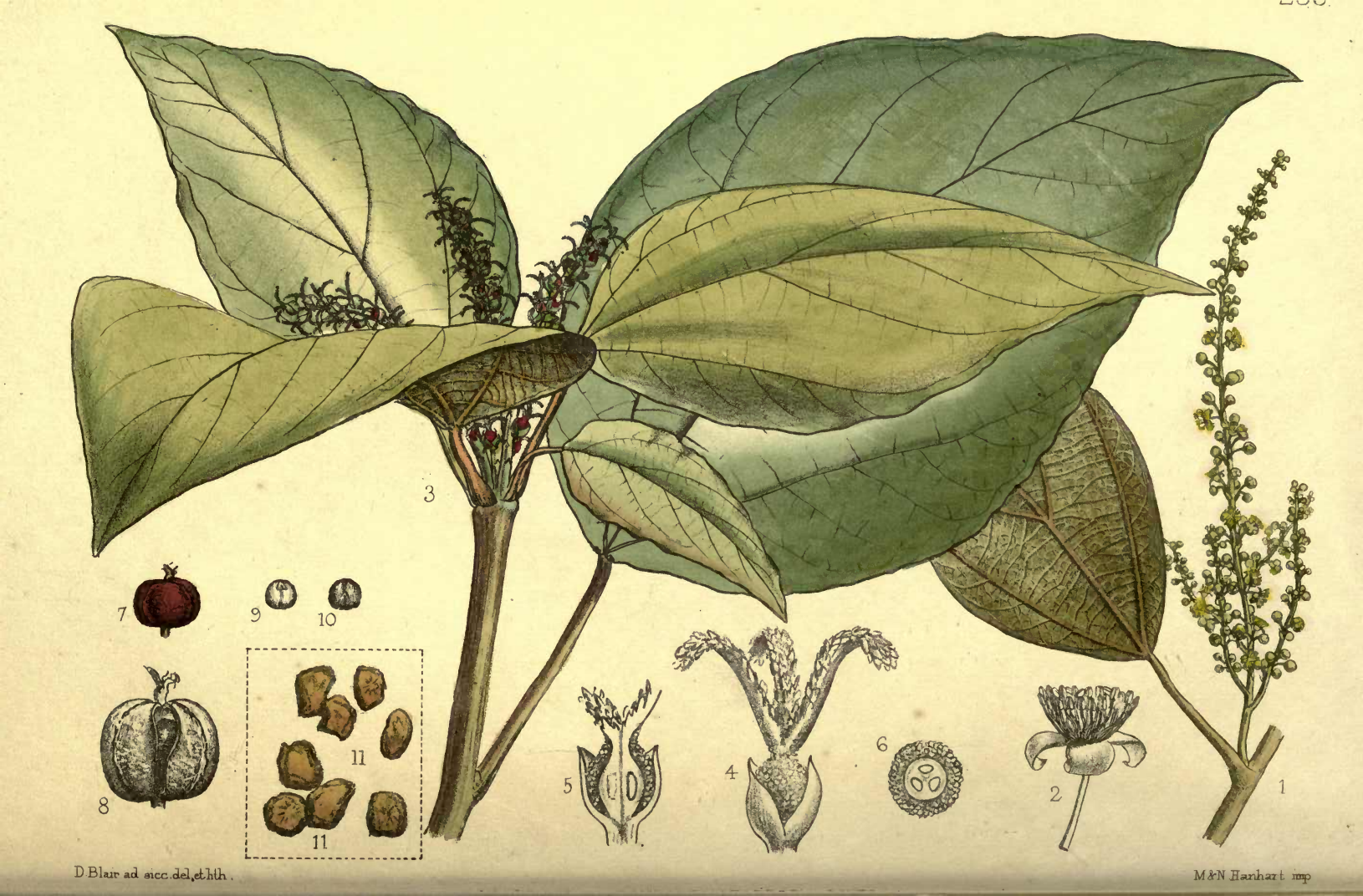
Medical Properties and Uses.—Peppermint is the most agreeable and powerful of all the mints. It possesses aromatic, carminative, stimulant, antispasmodic, and stomachic properties. These qualities are especially possessed by the official oil, which is employed in medicine in flatulence, nausea, flatulent colic of children, spasmodic affections of the stomach and bowels, and is a frequent addition to other medicines to cover their unpleasant taste. It is also extensively employed for flavouring cordials and sweetmeats.

Per. Mat. Med., by B. and R., p. 283; Pharmacographia, p. 434; U. S. Disp., by W. and B., pp. 559 and 1309; Per. Mat. Med., vol. ii, part 1, p. 512; Ph. Jl., Feb. 25, 1871, p. 682, and Oct. 14, 1871, p. 321.

DESCRIPTION OF PLATE.

Drawn from a plant grown in the garden of the Royal Botanic Soc., London.

1. A flower.
2. Corolla cut open.
3. Vertical section of calyx and ovary (1—3 enlarged.).



D.Blair ad nicc.del,et lith.

M&N Hanhart imp

N. Ord. EUPHORBIACEÆ.

Tribe *Acalypheæ*.

Genus Mallotus,* *Loureiro*. Müll. Arg. in DC., l. c., pp. 956—983; Baill., Hist. Pl., v, p. 196. Species 72, natives of the hot parts of the Old World.

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236. Mallotus philippinensis, *Müll. Arg. in Linnæa*, xxxiv, *p.* 196 (1865).

Kamela, Kamal, &c. (N. India), *Punnāga Kesara* (Sanskrit).

Syn.—Croton philippense, *Lam.* (1786). C. punctatus, *Retz.* C. coccineus, *Willd.* Rottlera† tinctoria, *Roxb.* (1798). R. aurantiaca, *H. & A.* Echinus philippinensis, *Baill.*

Figures.—Rheede, Hort. Malab., pt. 5, t. 21 (and t. 24, which represents a state with fasciated branches); Roxb. Corom. Pl., iii, t. 168; Beddome, Fl. Sylv., t. 289.

Description.—A tree of 20—30 feet, with a trunk 3—4 feet round; branches slender, with a pale bark, the younger ones covered with a more or less dense ferrugineous tomentum. Leaves articulated, alternate, petioles 1—2 inches long, rusty-tomentose, swollen at the end, blade 3—6 or more inches long, ovate or rhombic-ovate, with two obscure glands at the base, entire, coriaceous, upper surface glabrous, 3-nerved at base, veins very prominent on under surface, which is densely covered with a tomentum of minute, rusty, stellate hairs. Flowers dicœcious; female flowers in lax spike-like terminal and axillary racemes; male flowers 3 together in the axils of small bracts, arranged in longer often much branched axillary panicles; both more or less set with ferrugineous tomentum. Male flowers:—perianth of 3 or 4 thin lanceolate reflexed leaves; stamens about 20 or more on long filaments, the connective tipped by a small red gland. Female flowers:—perianth of 2 (3, or more) broadly ovate leaves slightly

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* From μαλλωτός, woolly.

† Named after the Rev. Dr. Rottler, a Danish missionary at Tranquebar, in India, who died in 1836.

connected below; ovary included in the perianth, densely clothed with a thick covering of stellate hairs and minute red granular bodies; styles 3, broad, spreading, covered on their inner surface with long papillary processes. Capsule trigonous-globular, about $\frac{3}{8}$ths of an inch in diameter; pericarp tough, greenish, more or less covered with a bright crimson layer of minute, readily detached granules, dehiscing septifragally by 3 valves. Seeds one in each cell, short, round on back, flat in front, attached to summit of axis, dark purple-brown, smooth, without a caruncle.

Habitat.—This tree is widely distributed through the East, from Abyssinia (Hanbury) to the Indian peninsula, where it is common in the sub-Himalayan tract, ascending to 4500 feet, Ceylon, Malaya, the Philippines, Hongkong, and Australia, flowering November to January. It is cultivated in a few botanic gardens in this country, but has not yet flowered with us.

Roxb., Fl. Ind., iii, p. 827; Benth., Fl. Hongkong., p. 307; Benth., Fl. Austral., vi, p. 141; Müll. Arg. in DC. Prod., l. c., p. 980; Brandis, Forest Fl. Ind., p. 444.

Official Part and Names.—KAMALA. A powder which consists of the minute glands that cover the capsules of Rottlera tinctoria, *Roxb.* (B. P.)—A powder which consists of minute glands (*Kamala*) that cover the capsules (I. P.)—ROTTLERA, *Kameela.* The glandular powder and hairs obtained from the capsules of Rottlera tinctoria, *Roxburgh* (U. S. P. *Secondary*).

Production and Collection.—Kamala is produced in several parts of India, from which it is imported into this country and elsewhere. The following particulars of its collection in the north-west provinces of the Madras Presidency are derived from *Pharmacographia* :—" Enormous quantities of *Rottlera tinctoria* are found growing at the feet of these hills, and every season numbers of people, chiefly women and children, are engaged in collecting the powder for exportation to the plains. They gather the berries in large quantities, and throw them into a great basket, in which they roll them about, rubbing them with their hands so as to divest them of the powder, which falls

through the basket as through a sieve, and is received below on a cloth spread for the purpose. This powder forms the *Kamala* of commerce, and is in great repute as an anthelminitic, but is most extensively used as a dye. The adulterations are chiefly the powdered leaves, and the fruit-stalks with a little earthy matter, but the percentage is not large. The operations of picking the fruit and rubbing off the powder commence here in the beginning of March and last about a month." Kamala is also collected in Eastern Africa and Southern Arabia.

General Characters and Composition. — Kamala is a fine, granular, mobile powder, of a brick-red or madder colour, with but little smell or taste. It is insoluble in cold water, and nearly so in boiling water, but ether, alcohol, chloroform, and benzol dissolve its resinous portion, and form deep red solutions. It resembles lycopodium by floating on water, and by igniting when sprinkled over a flame. When examined by a microscope it is seen to consist of minute irregular spherical, semi-transparent, garnet-red glands with a wavy surface, more or less mixed with stellate hairs and sand. The glands or pure kamala may be removed by sifting.

Much doubt exists as to the chemical constitution of kamala. Some years since Dr. Thomas Anderson, of Glasgow, obtained a principle, which he called *Rottlerin,* in the form of minute, yellow, platy crystals with a satiny lustre. These crystals were readily soluble in water, sparingly soluble in cold alcohol, but more so in hot alcohol, and insoluble in water. Leube, who afterwards examined kamala, was unable to obtain this principle, but he found two resins which together formed 80 per cent. of the drug, and these he regarded as the active constituents. It is certain, however, that minute crystals may be obtained in some cases from an ethereal solution of kamala by spontaneous evaporation, but the exact nature of these crystals is unknown.

Medical Properties and Uses.—Kamala acts speedily and actively as a purgative, but it not unfrequently causes much nausea and griping. In India it has long been employed as an anthelmintic, being especially adapted for the expulsion of tape-worm. Dr. Mac-

kinnon, after an extended trial, says that kamala is a safe and efficient remedy for tape-worm, and more certain than either turpentine or kousso. Dr. Anderson, an army surgeon in India, also speaks highly of its value. He writes, "The worm is generally passed entire, and almost always dead, and in all the cases I have examined (fifteen) I was able to detect the head." It is, however, but little esteemed in this country as an anthelmintic, fern rhizome being generally regarded as more efficacious. Garrod says, however, that he has used it with success in some cases. Kamala has also been used externally in this country in herpetic ring-worm. In India kamala is also frequently employed as an external application in scabies and various other affections of the skin. It is also used in India for dyeing silk a rich orange-brown. The dye is also known at Aden under the name of *Waras* or *Wurrus*.

Pharmacographia, p. 515; Ph. Jl., vol. xii (1853), 386, 589, and vol. xvii (1858), 408; Per. Mat. Med., by B. and R., p. 536; U. S. Disp., by W. and B., p. 744; Gar. Mat. Med. p. 312.

DESCRIPTION OF PLATE.

Drawn from Indian specimens in the herbarium of the Brit. Museum, the male plant collected by Wallich; the female collected by Dr. Thomson. 1. A male panicle. 2. A male flower. 3. Extremity of branch of a female plant. 4. A female flower. 5. Vertical section of the same. 6. Transverse section of the ovary. 7 and 8. Fruit. 9. Front and 10. Back view of a seed. 11. Some of the small glands removed from the capsule. (2, 4—6, and 8 enlarged. 11 greatly magnified.)

D.Blair ad sicc del et lith.

M&N Hanhart imp

CROTON ELUTERIA, *J. J. Benn*

N. Ord. EUPHORBIACEÆ.

Tribe *Crotoneæ*.

Genus Croton,* *Linn.* (emend). Baill., Hist. Pl., v, p. 129; Müll. Arg. in DC. Prod., xv, sect. 2, pp. 512—700. Species about 450, mostly tropical.

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238. Croton Eluteria,† *J. J. Bennett, in Journ. Linn. Soc.,* iv (1859), *p.* 29 (non *Swartz*).

Sweetwood Bark. Sweet Bark. Bahama Cascarilla.

Syn.—Elutheria, *Linn., Hort. Cliff.* Clutia Eluteria, *Linn., Sp. Plant.*

Figures.—Woodville, t. 223, fig. 2; cop. in Steph. & Ch., t. 150 (drawn from Dean's specimens in Brit. Museum); Daniell, in Pharm. Journ., 1862, 1st plate.

Description.—A compact shrub or small tree, attaining at the most 20 feet, and usually much smaller, with slender wand-like branches, which frequently divide dichotomously at an acute angle. Bark fissured, pale yellow-brown, scented; the young twigs covered with minute peltate scales. Leaves few, alternate, without stipules, on longish petioles; blade 1½—2½ inches long, ovate-lanceolate, rounded or sub-cordate at the base, much attenuated into the blunt apex; margin somewhat undulated or irregularly dentate; the under surface, as also the petioles, entirely covered, so that the venation is concealed, by a close coating of minute, peltate, radiated scales, white with a bronze centre, giving the surface a metallic bronzed-silver appearance; on the upper surface the scales are entirely white, more scattered, not forming an unbroken layer. Flowers monœcious, in erect axillary racemes; the pedicels and calices rusty-looking, with bronzed stellate scales, bracts shorter than the pedicels, buds nearly globular; petals white. Male flowers numerous in each raceme: calyx deeply 5-partite, the divisions broad and rounded; petals

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* From κροτών, a tick.

† The name *Eluteria* is derived from Eleuthera, one of the Bahama Is. adjacent to Providence Island.

5, fringed; stamens about 15, inserted on the receptacle. Female flowers few at the base of the racemes: calyx deeply 5-partite, the divisions lanceolate, acute; petals 5, fringed, shorter than the calyx; ovary rounded, covered externally with scales, 3-celled, with one suspended ovule in each cell; styles 3, thick, cylindrical, each three times dichotomous. Capsule ovoid, $\frac{3}{5}$ths of an inch long, silvery-grey with stellate scales, 3-celled; pericarp thin, dehiscing septicidally into 3 valves, which afterwards separate from the axis and split loculicidally. Seeds solitary in each cell, smooth, shining, orange-brown, with the caruncle paler; rounded on the back, flat on the sides, and strongly ridged by the ventral raphe; embryo straight in axis of endosperm.

Habitat.—The Sweet Bark grows in all the islands of the Bahamas group, chiefly on low hills, and in Cuba. The British Museum contains also a specimen collected by Michaux in "the southern parts of N. America;" but the species is not included in Chapman's Flora of these States. The shrub is said to have been introduced into England by P. Miller in the last century, but it is not now, we believe, in cultivation. The flowers are described as deliciously sweet-scented, and appear in March and April.

Daniell in Pharm. Journ., ser. 2, iv (1862), p. 145; Müll., Arg., l. c., p. 516; Grisebach, Fl. W. Ind. (1864), p. 39.*

Official Part and Names.—Cascarillæ Cortex. The bark (B. P.)—The bark (*Cascarillæ Cortex*) (I. P.)—Cascarilla. The bark (U. S. P.)

Commerce.—Cascarilla bark is imported from Nassau, the principal town in New Providence, one of the Bahama Islands.

General Characters and Composition.—Cascarilla bark usually occurs in quills, which vary in length from one, to two, three, or more inches, and in diameter from the size of a common goose-

* Grisebach here recombines this shrub with *C. Sloanei*, J. J. Benn. (*C. Eluteria*, Swartz, *C. glabellus*, Müll. Arg.), a native of Jamaica, figured very badly in Woodville, t. 223, fig. 1, and beautifully in Hayne, xiv, t. 1, Daniell, 2nd plate, and B. & S., t. 28, b. But the species seem so thoroughly distinct, and were so clearly distinguished by Bennett, that this retrograde step is little likely to be followed.

quill to that of the little finger. The external suberous coat is easily separated from the inner coats, and is more or less covered with a silvery-white minute lichen (*Verrucaria albissima*, Ach.), the perithecium of which is seen in the form of black specks. The colour of the suberous coat when not coated with lichens is dull brown, which is also the colour of the bark generally. The bark is moderately hard, has a compact texture, and breaks readily with a short resinous fracture. The taste is warm and nauseously bitter, and its odour agreeable and aromatic, more especially when burned: hence by this character cascarilla is readily distinguished from other barks.

The principal constituents of cascarilla bark are a *volatile oil*, *resin*, and a bitter crystalline principle, first isolated by Duval, and named by him *Cascarillin*.

Medical Properties and Uses.—Cascarilla bark is aromatic, bitter, and tonic. Formerly it was much used, especially in Germany, as a substitute for cinchona; but although it is very far inferior to this bark as a tonic and febrifuge, it is a useful tonic in convalescence after fevers. In this country it is principally employed in atonic dyspepsia, in chronic bronchial affections to check excessive secretion of mucus, and in chronic diarrhœa and dysentery. The agreeable musky odour which it produces when burned also renders it a useful ingredient in fumigating pastilles, for which purpose it is frequently used. For the same reason it is sometimes mixed in small quantities with tobacco, in order to render it more agreeable for smoking. It is said, when thus used, to cause giddiness and intoxication, but this is scarcely probable.

Per. Mat. Med., vol. ii, part 1, p. 412; Pharmacographia, p. 506; U. S. Disp., by W. and B., p. 234; Journ. de Pharm., 3rd ser. viii, 96.

DESCRIPTION OF PLATE.

Drawn from specimens collected in Providence Island, Bahamas, by Dr. W. F. Daniell in 1858 (Brit. Museum). 1. Small branch, with leaves and several racemes of fruit and flowers. 2. Male flower. 3. The same in vertical section. 4. Female flower. 5. Vertical section of the same. 6 and 7. Fruit. 8. Transverse section of the same. 9 and 10. Seed, inner surface. 11. Scale from leaf. (2—5, 7, 8, and 10 enlarged. 11 greatly magnified.)

D.Blair ad.nat.del et lith.

M&N Hanhart imp

CROTON TIGLIUM. *Linn.*

N. Ord. EUPHORBIACEÆ.

Tribe *Crotoneæ*.

Genus Croton, *Linn.*

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239. Croton (*Eu-croton*) Tiglium,* *Linn., Sp. Plant., ed.* i, *p.* 1004 (1753).

Jamalgota. Jepāl. Purging Croton.

Syn.—Tiglium officinale, *Klotzsch.* Croton Jamalgota, *F. Hamilton.*

Figures.—Nees, t. 138; Woodville, vol. v; Hayne, xiv, t. 3; Berg & Sch., t. 17 e; [Steph. & Ch., t. 4, "taken from a drawing in the Medico-Botanical Society in London," can scarcely be this species]; Burm., Thes. Zeyl., t. 90; Rheede, Malab., pt. ii, t. 33; Marchand in Adansonia, i, t. 9, 10; Baillon, Hist. Pl., v, f. 196—202.

Description.—A small tree, 15—20 feet high; trunk rather crooked, with smooth bark; branches slender, smooth, terete; bark pale whitish-brown, marked with scars of the fallen leaves. Leaves alternate, on stalks nearly half as long as the blade; blade about 4½ inches long by 2 inches wide when full grown, thin, glabrous, ovate, attenuate at the apex, faintly and rather distantly serrate, pale bright green, veins prominent beneath, petiole breaking up immediately on entering the leaf into 5 veins, the two lateral faint, the two intermediate well marked, giving with the mid-rib a triple-nerved aspect to the leaf; on either side of base of the blade and connected with the petiole is a prominent sessile gland; stipules minute, filiform, deciduous; the young leaves and buds with scattered stellate hairs. Flowers in lax, terminal, erect racemes, unisexual; the male at the upper part of the raceme, the female less numerous at the lower part; pedicels longer than the flowers; bracts minute. Male flower: calyx of 5 spreading, broadly triangular, blunt sepals, with valvate æstivation; petals 5, inserted on the flat receptacle, alternate with and reflexed between the sepals, oblong-linear, blunt, set with rather

* The seeds were called *Grana Tiglii* or *Grana Tilli* by the pharmacists of the 17th century; but we do not know the origin of these names.

long white hairs above, glabrous beneath, pale green; a prominent roundish yellow gland stands within each sepal, alternating with the petals; stamens 14—20, as long as the petals, one opposite each petal and sepal, the remainder irregularly dispersed over the receptacle, which is covered with short white hairs, anthers small, broad, innate, cells semilunar. Female flower; calyx deeply 5-partite, divisions ovate, acute, spreading or reflexed, set with few or more numerous stellate hairs and with a small rounded prominence in the angle between each; glands 5, blunt, prominent, opposite the sep., as in the male flowers; petals round; ovary sessile, thickly covered with stellate hairs, 3-celled, with a single pendulous ovule in each; styles 3, deeply bifid. Fruit about the size of a hazel-nut, slightly inflated, pale, smooth, brownish-yellow, capsular, 3-celled, with a single large seed in each cell; dehiscing septicidally into 3 cocci, and afterwards loculicidally. Seeds nearly $\frac{1}{2}$ an inch long by about $\frac{2}{3}$ths wide, ovoid, rounded on the back, marked on the ventral surface by a fine raised raphe; testa thin, brittle, light brown, black within; embryo with large foliaceous cotyledons, lying in the centre of the oily endosperm.

Habitat.—The croton oil plant is common throughout the Indian Peninsula, both wild and cultivated; it also grows in Ceylon, Borneo, and the Philippines, and as an introduced tree in Mauritius and Japan. It was first cultivated in this country in 1798, and is now to be seen in many botanic gardens, though it rarely flowers.

Marchand in Adansonia, i, p. 232; Müll. Arg., l. c., p. 600; Roxb., Fl. Ind., iii, p. 682; F. Hamilton in Trans. Linn. Soc., vol. xiv, p. 258.

Official Parts and Names.—Oleum Crotonis. The oil expressed from the seeds (B. P.)—The seeds (*Crotonis semina*) (I. P.)—Oleum Tiglii. The fixed oil obtained from the seed (U. S. P.)

General Characters and Composition of Croton Seeds.—The croton seeds of commerce are about the size of coffee beans, oval in shape and imperfectly quadrangular in form. The testa is of a dark cinnamon-brown colour on the surface, but when scraped it

presents a black appearance. This testa is brittle, and encloses a pale-coloured, delicate seed-coat, within which is the yellowish-oily albumen enclosing the embryo which has been already described. The seeds have no odour, and at first they have but a mildly oleaginous taste, but soon become persistently acrid and burning.

The principal constituents of croton seeds are a *fatty fixed oil* (see *Characters of Croton Oil*), *tiglinic acid*, *crotonic* or *quartenylic acid*, and *crotonol*. The latter is asserted by Schlippe, who has alone isolated it, to be the drastic principle of croton oil. The purgative principle has not been isolated. Tuson has indicated the presence of an alkaloid in croton seeds analogous to *cascarillin* from cascarilla bark, but his experiments require confirmation.

General Characters of Croton Oil.—Two varieties of croton oil are known in this country; one which is imported from India, and another, the one now almost generally in use, is expressed here from croton seeds which are chiefly imported from Cochin or Bombay. In India, in order to obtain the oil, the seeds are first subjected to slight torrefaction, by which the shell is more easily separated, and the kernel or nucleus is then submitted to pressure. In this country the commercial seeds, after having their shells removed, are submitted to pressure. The kernels yield from 50 to 60 per cent. of oil. Croton oil has a fluorescent appearance, more especially the English pressed oil, a viscid consistence, which is increased by age, a faint, peculiar, somewhat rancid, disagreeable odour, and an oily, acrid taste. The colour of the two varieties varies, that of the East Indian croton oil being pale yellow, and the English oil varying from brownish yellow to dark reddish brown like the deepest coloured sherry. Both kinds are soluble in ether and oil of turpentine, but they vary in their relations to alcohol—that of English oil being entirely soluble, while the Indian oil forms an opaque mixture with alcohol, which becomes clear if heat be applied, but the oil separates again by standing. Croton oil essentially consists of the fatty fixed oil mixed with the other constituents of the seeds.

Medical Properties and Uses.—Croton seeds when applied externally act as a powerful local irritant, and when given internally, in doses of a grain, as a very active drastic purgative. From their poisonous character when given in over doses they are not now used in this country. It is said, however, that in India, where the seeds are sometimes known under the name of *Jamalgata pills*, they have been used with great success in amenorrhœa; and Professor Erasmus Wilson speaks highly of a diluted tincture of croton seeds as a stimulant application in certain cutaneous affections, more especially in eczema, lichen, ichthyosis, and erythema.

Croton oil when rubbed on the skin acts as a rubefacient and counter-irritant, and when administered internally it operates as a powerful hydragogue cathartic. It is a most useful, and frequently a very valuable cathartic in any case in which it is desired to act speedily and powerfully on the bowels, as in obstinate constipation, in dropsy, in apoplexy, in paralysis, in torpid conditions of the intestinal canal, &c; and also in cases where the patient cannot or will not swallow, when it may be dropped on the tongue, as in some affections of the throat, mania, &c. The official liniments of the British and Indian pharmacopœias when rubbed on the skin produce redness and a pustular eruption. They act as useful stimulants when thus applied in chronic rheumatism, neuralgia, glandular and other indolent swellings, and in chronic bronchitis and other pulmonary affections.

U. S. Disp., by W. and B., p. 624; Pharmacographia, p. 508; Per. Mat. Med., vol. ii, part i, p. 409; Ph. Jl., vol. iv, 2nd series, 382 and 387; Per. Mat. Med., by B. and R., p. 525; Wilson, Diseases of the Skin, p. 177.

DESCRIPTION OF PLATE.

Drawn from a specimen kindly sent by Dr. D. Moore from Glasnevin Garden, Dublin, where it flowered in September, 1874; the fruit added from examples in the Museum of the Pharmaceutical Society of Great Britain. 1. A flowering branch. 2. Male flower. 3. Section of the same. 4. A female flower. 5. Section of same. 6. Fruit. 7. Transverse section of the same. 8. Seed, ventral surface. 9. Vertical section of the same. 10. A stellate hair from the inflorescence. (2—5 enlarged. 10 much magnified.)

D.Blair ad nat del et lith.

M.&N.Hanhart imp

STILLINGIA SYLVATICA, *Linn.*

N. Ord. EUPHORBIACEÆ.

Tribe *Hippomaneæ*.

Genus **Stillingia**,* *Garden, in Linn. Mant.* Müll. Arg., l. c., pp. 1155—1162; Baill., Hist. Pl., v, p. 135. Species 12, natives of tropical regions in both hemispheres.

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241. Stillingia sylvatica, *Linn., Mant., p.* 126 (1767).

Queen's Delight.

Syn.—Sapium sylvaticum, *Torrey.*

Not previously figured.

Description.—Stems numerous from a large woody root, erect or ascending, 1—3 feet high, herbaceous or slightly woody below, simple, umbellately branched above, smooth, terete, with a milky juice. Leaves numerous, alternate, irregularly scattered or crowded, nearly sessile, variable in form from narrow-lanceolate to broad-oval, tapering at base, closely crenate-serrate, with a gland in each crenature, rather thick; stipules minute, setaceous, deeply divided, early deciduous. Inflorescence arranged upon a thick, terminal, compressed, yellowish axis, afterwards exceeded by the two or more branches which are given off from below its base, 2—4 inches long. Flowers unisexual; the male flowers in dense clusters of 8 or 10, arranged round the spike for nearly its whole length, each cluster in the axil of a thin, broad, acute scale with a scarious margin, and provided on either side with a large, circular, shallow, cup-shaped gland attached by its centre; the female flowers very few (or none) at the base of the spike, solitary, in the axil of similar bracts to those of the male clusters. Male flowers shortly stalked, consisting of 2 stamens on long filaments connected for half their length and surrounded by (at first enclosed in) a membranous, cup-shaped, two-cleft calyx.

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* Named after Dr. Benjamin Stillingfleet, an English botanist of the 18th century, author of 'Miscellaneous Tracts relating to Natural History, &c.' 1759.

Female flowers; calyx 3-lobed; style slender, articulated below, with 3 spreading branches. Capsule roundish, slightly rough, greenish brown, 3-celled, with a single seed in each cell, separating into 3 cocci, which open down their dorsal suture. Seeds nearly globular, silvery white, roughish, with a well-marked caruncle.

Habitat.—Common in dry sandy soil in the Southern United States of America from Virginia to Florida and westward to Texas. It is an insignificant weed-like plant, and is not in cultivation in English gardens.

Müll. Arg., l. c., p. 1158; A. Gray, Man. Bot. U. S., p. 391; Chapman, Fl. S. States, p. 404.

Official Part and Name.—Stillingia. *Queen's Root.* The root of Stillingia sylvatica (U. S. P.)—Not official in either the British Pharmacopœia or the Pharmacopœia of India.

General Characters and Composition.—Stillingia has been fully described by Dr. Wood in the *United States Dispensatory*. It occurs in long cylindrical pieces, from a third of an inch to more than an inch thick, wrinkled from drying, of a dirty yellowish-brown colour externally, and, when cut across, exhibiting an interior soft, yellowish, ligneous portion, surrounded by a pinkish-coloured bark. The odour is slight, peculiar, and somewhat oleaginous, but in the recent root is said by Dr. Frost to be strong and acrimonious. The taste is bitterish and pungent, leaving an impression of disagreeable acrimony in the mouth and fauces. Nothing certain is known of its composition, but the active principle is said to be volatile, and the root consequently loses much of its activity when kept. Its virtues are imparted to both water and alcohol.

Medical Properties and Uses.—Stillingia is emetic, cathartic, and alterative. It is regarded by Dr. T. Young Symons, of the United States, who first introduced it to the notice of the profession, as a valuable alterative in syphilis and other affections where mercury is commonly employed. Other physicians have also spoken highly in favour of its use, and from their testimony its value is regarded in the United States of America, as established

in secondary syphilis, scrofula, various cutaneous diseases, chronic diseases of the liver, and other complaints ordinarily benefited by alterative medicines. It may be either given alone or combined with sarsaparilla and other alteratives. So far as we know, this remedy has not been used in this country, but from the testimony given of its value by medical practitioners in the United States it is well deserving of a trial.

United States Dispensatory, by Wood and Bache, p. 838.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Brit. Mus. collected by Dr. Garden in Carolina; the fruit added from a Texan specimen collected by Lindheimer, in the same herbarium.

1. Upper part of a flowering stem.
2. Portion of spike showing male clusters.
3. A male flower.
4. Fruit.
5. Transverse section of same.
6, 7. A seed.
8. The same seen from side.

(2, 3, 7, 8 enlarged.)

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D Blair ad nat del et lith

M & N Hanhart imp

N. Ord. STERCULIACEÆ. Le Maout & Dec., p. 283.

Tribe *Byttneriaceæ*. Lindl., Veg. K., p. 363 (N. Ord.); Baill., Hist. Pl. iv, p. 75.

Genus Theobroma, *Linn.** B. & H., Gen., i, p. 225; Baill., l. c., p. 77; Bernoulli in Nouv. Mém. de la Soc. Helvet. des Sc. Nat., vol. xxiv (1871). Species about 8, natives of tropical America.

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38. Theobroma Cacao *Linn., Sp. Pl. ed.* 1, *p.* 782 (1753).

Cacao. Cocoa or Chocolate Tree.

Syn.—Cacao sativa, *Lam.* C. Theobroma, *Tussac.* C. minus, *Gaertn.*

Figures.—Nees, t. 419; Tussac, Fl. Antilles, i, t. 13, cop. in Hayne, ix, t. 35; Berg & Sch., t. 33 e & f; Sloane, Hist. Jamaica, t. 160; Bernoulli, l. c., t. 1 & 2.

Description.—A tree of no great size, with round branches covered with a smooth greyish bark. Leaves alternate, stalked, 8 or 9 inches long by 2½ wide or even larger, ovate-lanceolate or ovate-oblong, acute, rounded at the base, entire, veins prominent beneath; petiole 1 inch long, thickened at both ends; stipules caulinary, subulate-linear, acutely serrate, young leaves pink. Flowers on delicate, pubescent, articulated, often branched stalks, in clusters from the old wood of the branches and trunk, occupying the position of former leaf-axils. Calyx very deeply 5-cleft, divisions ovate-acuminate, pale red, membranous, woolly on the edge. Petals 5, alternating with the calyx-segments, the lower half erect, hood-shaped, pale-pink, marked on the inside with two crimson prominent nerves, the upper half spreading, spathulate, on a filiform stalk, lemon-yellow. Androœcium forming at its base a hypogynous tube surrounding the ovary, and consisting of 5 stamens opposite the petals, which are bent outwards and received into the cucullate bases of the latter, and, alternating with these, 5 elongated linear processes (staminodes), which stand erect, and are of a brilliant crimson; filaments short, anthers small, green, extrorse, each consisting of 4 cells arranged crosswise (2 anthers combined ?). Ovary small, sessile, pen-

* Name from Θεός, a god, and βρῶμα, food.

tagonous, pilose, 5-celled; style tapering, a little longer than the stamens, dividing into 5 short branches at the summit; ovules numerous, placentation axile. Fruit pendulous, solitary or two or three together, large, 6 or 7 inches long, of an elongated pyriform shape, tapering at the end, marked with (usually) 10 shallow furrows and blunt ridges, surface more or less tubercular, at first yellow, afterwards red or purple, pericarp thick, tough, inner portion harder; 5-celled. Seeds numerous and closely packed in tiers in each cell, about the size of almonds, but more irregular in form from mutual pressure, immersed in copious sweet buttery pulp; seed-coats two, the outer membranous, veined; cotyledons large, thick, irregularly crumpled and divided, with a process of the inner seed-coat passing into each fissure, radicle conical, indistinct, endosperm wanting.

Habitat.—The chocolate tree is a native of parts of Brazil and other northern portions of South America, extending also into Central America as far north as Mexico. It is extensively cultivated throughout the tropics of both the new and old worlds, especially in some of the West Indian Islands. Examples may be seen here in the hot-houses of several botanic gardens, the tree having been introduced in 1759. There are several varieties or races in cultivation

DC. Prod., i, p. 484; Triana & Planch., Fl. Nov. Granat., p. 208; Humb., Bonpl. & Kunth, v, p. 316; Sloane, Jamaica, ii, p. 15; Griesbach, Fl. W. Ind., p. 91; Lindl., Med. Bot., p. 138.

Official Part and Name.—Oleum Theobromæ. A concrete oil obtained by expression and heat from the ground seeds (B. P.). A concrete oil (*Theobromæ Oleum*) obtained by expression and heat from the ground seeds (I. P.). Oleum Theobromæ. The concrete oil of the kernels of the fruit (U. S. P.).

Production.—Oil of Theobroma, or, as it is commonly termed, Cacao butter, is generally obtained from the Chocolate manufacturers, who procure it by submitting the warmed seeds to pressure. The kernels of cocoa seeds yield on an average about half their weight of oil.

General Description and Composition.—Oil of Theobroma is usually seen in the form of oblong cakes or tablets, weighing about half a pound each. It is a yellowish, opaque, dry substance,

about the consistence of tallow, with a bland agreeable taste, and a pleasant odour resembling chocolate. It breaks readily, and presents a dull waxy fracture. Its sp. gr. is 0·961, and it melts at a temperature of 122° Fahr. It does not become rancid from exposure to the air. Its chief constituent is *stearin*, hence it is one of the best fats for the preparation of stearic acid.

Uses.—Cacao butter has been but lately introduced into the British and United States pharmacopœias, but it has been long used on the Continent. It is peculiarly well adapted from its consistency, blandness, and freedom from rancidity, for the preparation of suppositories, for which purpose it is official. It is also used as a basis for pessaries, as an ingredient in cosmetic ointments, and for coating pills and other purposes.

Cocoa or Cacao Seeds.—The principal use of cocoa seeds is not, however, on account of the concrete oil they yield, but for the preparation of chocolate and cocoa; hence they are sometimes called *chocolate nuts*. Cocoa seeds are principally imported into this country from our West Indian Colonies, and more especially Trinidad and Granada.

Chocolate, which derives its name from the Indian term *chocolat*, is prepared as follows:—The seeds are first roasted, then divested of their husks or shells, and the kernels afterwards crushed between heated stones or rollers, by which they are reduced to a pasty consistence. This paste is then mixed with sugar, and some vanilla or cinnamon added for flavouring, and usually a small quantity of arnatto as a colouring agent, and, finally, it is moulded into cakes. This is essentially the mode of preparation of the finer qualities of chocolate, but the flavouring of the inferior kinds is sometimes produced by adding sassafras nuts, cloves, or some other spice. Chocolate is adulterated in some cases with rice flour, various starches, lard, and other substances.

Cocoa is prepared either by grinding up the roasted seeds with their husks between hot cylinders into a paste, which is then mixed with variable amounts of sugar, starch &c., and formed into *common cocoa*, *rock cocoa*, *soluble cocoa*, &c.; or, the roasted seeds, divested of their husks, are broken into small fragments, in which state they form *cocoa nibs*, the purest kind of cocoa.

Both cocoa and chocolate are very largely used for the preparation of agreeable and nutritious beverages; indeed, the generic name *Theobroma* was given to the tree yielding cocoa seeds by Linnæus, to mark his high opinion of the agreeable and valuable properties of the beverages prepared from them, although Belzoni, a traveller of the sixteenth century, regarded them in a very different light, for he declared that cocoa was a drink "fitter for a pig than for a man." Cocoa and chocolate are not such refreshing and stimulating beverages as tea and coffee, but they are much more nutritious in consequence of the large quantity of concrete oil (*Oleum Theobromæ*) they contain, although, from the same cause, they disagree with many persons. To such persons cocoa nibs should be recommended.

Cocoa and chocolate form the common unfermented beverages of about fifty millions of persons in Spain, Italy, France, and Central America, and it has been estimated that more than 100,000,000 lbs. of cocoa seeds are annually consumed in these countries, Spain alone consuming forty millions of pounds. Cocoa is also now largely used in this country, and its consumption has enormously increased of late years. Thus, in 1820 the consumption of cocoa seeds was only 276,321 lbs., in 1860 it had increased to 4,583,124 lbs., while in 1873 it was over eight millions of pounds.

Cocoa seeds owe their properties to the concrete oil already fully described (*Oleum Theobromæ*), and to an alkaloid named *theobromin*, which resembles both *thein* and *caffein*, the alkaloids respectively of tea and coffee, both in its chemical characters and effects. (See Tea and Coffee.)

Per. Mat. Med., by B. and R., p. 920; Pharmacographia, p. 88; U. S. Disp., by W. and B., p. 620; Bentl. Man. Bot., p. 440; Chem. Gaz., Aug. 15, 1854, p. 306; Soc. Arts Jl., March 13, 1874.

DESCRIPTION OF PLATE.

Drawn from a specimen in the tropical house of the Royal Gardens, Kew, flowering in June. The fruit added from a specimen preserved in spirit in the British Museum. 1. Portion of the trunk bearing flowers and foliage. 2. A single flower. 3. A petal. 4. The staminal whorl partly cut away and flattened out. 5. Vertical, and 6, transverse sections of ovary. 7. Fruit. 8. Seed. 9. Embryo. 10. The same, with one cotyledon removed. (2—6 enlarged.)

D.Blair ad nat del. et lith.

M.&N.Hanhart imp.

RHAMNUS CATHARTICUS .L.

N. Ord. RHAMNACEÆ. Lindl., Veg. Kingd., p. 581; Le Maout and Dec., p. 346; Baill., Hist. Pl., vi.

Tribe *Rhamneæ*.

Genus Rhamnus,* *Linn.* (in part). B. & H., Gen., i, p. 377; Baill., l. c., p. 51. Species about 60, generally distributed; rare in the tropics.

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64. Rhamnus catharticus, *Linn., Sp. Pl. ed.* 1, *p.* 193 (1753).

Buckthorn.

Syn.—Cervispina cathartica, *Moench.*

Figures.—Woodv., t. 210; Steph. & Ch., t. 119; Hayne, v, t. 43; Nees, t. 360; Berg & Sch., t. 16 f; Syme, E. B., ii, t. 318.

Description.—A dense, spreading, much-branched bush or small tree, not reaching more than about 12 feet high, the smaller branches often ending in a sharp spine; bark rather smooth, dark grey. Leaves variously arranged: fasciculate on the short twigs of the previous year, alternate or sub-opposite on the young green shoots of the current year; dingy-green, smooth, petioles about half as long as the blade; stipules small, linear, deciduous; blade 1—1½ inches long, broadly oval, rounded or slightly attenuated at the apex, finely serrulate; veins very prominent beneath, the lateral ones few, arched in a direction parallel with the margin. Flowers dicœcious, very small, yellowish-green, stalked, in small sessile umbels or solitary from the axils of the fascicles of leaves on the previous year's twigs. Male flowers: calyx-tube campanulate; limb in 4 ovate-lanceolate segments; petals 4, linear-spathulate, much smaller than the calyx-segments with which they alternate; stamens 4, immediately opposite the petals, and with them inserted on the upper margin of the calyx-tube (disk); pistil quite rudimentary. Female flowers: calyx as in the male, but tube wider to accommodate the ovary; petals much smaller than in the male, and stamens rudimentary; ovary superior, enclosed in the

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* Ῥάμνος, the classical name, originally applied to the spiny *Paliurus.*

calyx-tube but free from it, 4-celled, with one erect ovule in each cell; style cleft about half-way down into 4 blunt branches. Fruit fleshy, round, about the size of a pea, umbilicated at the apex, surrounded at the base by a circular persistent portion of the calyx-tube, shining, at first green, then black; skin thin; pulp scanty, containing 4 hard, indehiscent, dark-brown stones (pyrenes), which are obovoid, grooved on their outer surface, where the walls are folded inwards, hollow in the centre, angled at the inner edge, where they meet in the middle of the fruit. Seeds one in each stone, furrowed deeply on back, shallowly on front, curved from side to side in a revolute manner (so as to make a horseshoe on section) round the central cavity of the stone, the convexity inwards; embryo in the axis of scanty endosperm, and similarly curved, cotyledons large, raphe running to the top of the seed in the dorsal furrow.

Habitat.—In England this shrub is chiefly, though not exclusively, found in chalky districts, where it occurs in thickets and small woods. It is not unfrequent in the south, but becomes rare northwards, and is not native in Scotland. In Europe it is found in all parts except the extreme north, and extends far eastwards into Siberia; it has also been observed in Algeria, and is cultivated in the United States. The structure of the fruit is remarkable and quite unlike that of a true berry, to which its outward appearance is so similar; one or two of the stones are frequently abortive.

Syme, E. Bot., ii, p. 226; Hook. f., Stud. Fl., p. 82; Wats., Comp. Cyb. Br., p. 136; Gren. and Godr., Fl. France, i, p. 335; Lindl. Fl. Med., p. 167.

Official Part and Name.—Rhamni Succus. The recently expressed juice of the ripe berries (B. P.). The recently expressed juice of the ripe berries (*Rhamni Succus, Buckthorn juice* (I. P.). Not official in the Pharmacopœia of the United States.

Collection.—Buckthorn fruits are plentiful in certain parts of Hertfordshire, Oxfordshire, Buckinghamshire, Wiltshire, and some other counties in England, and from these parts

our supplies are chiefly obtained; but the collectors commonly prefer to supply the juice expressed by themselves rather than the ripe fruit, and as this juice is generally, as shown by Umney, largely diluted with water, the supply of the ripe fruit ought to be insisted on.

General Characters and Composition of the Juice.—The fresh juice is green, and has a very unpleasant odour, and a bitterish, somewhat acrid, disagreeable taste. Its specific gravity, according to Umney, should be 1·070 to 1·080. By keeping, its colour gradually changes to red, and its specific gravity, from a deposition of solid matter, is reduced to 1·035.

Buckthorn fruit and juice have been repeatedly analysed, and several colouring principles have been obtained from them and similar parts of other species of *Rhamnus*, but at present we have no satisfactory evidence of the source of their active purgative properties, although Winckler believes that this resides in a principle which he has termed *cathartin*. A yellow crystalline principle has also been indicated by Fleury, who named it *rhamnine*, and more recently this has been examined by Lefort and other chemists, but with very conflicting results.

Medical Properties and Uses.—Buckthorn juice is a powerful hydragogue cathartic, but as its action is frequently attended with severe griping, nausea, and thirst, it is but very little used at the present day, except as a domestic remedy and in veterinary practice. It is generally prescribed in the form of syrup for children.

Formerly buckthorn juice was frequently employed in cases where an active cathartic was required, as in gout and rheumatism, obstinate constipation, and dropsical affections. Lately, the bark of *Rhamnus Frangula*, Alder Buckthorn, which has been long employed in Germany, has been highly recommended for use in this country as being a valuable cathartic without causing any of the distressing effects so frequently found to accompany the action of buckthorn juice. (See *Rhamnus Frangula.*)

The pigment, so well known as *sap-green*, the *vert de vessie* of

the French, is prepared by evaporating to dryness fresh buckthorn juice which has been previously mixed with lime.

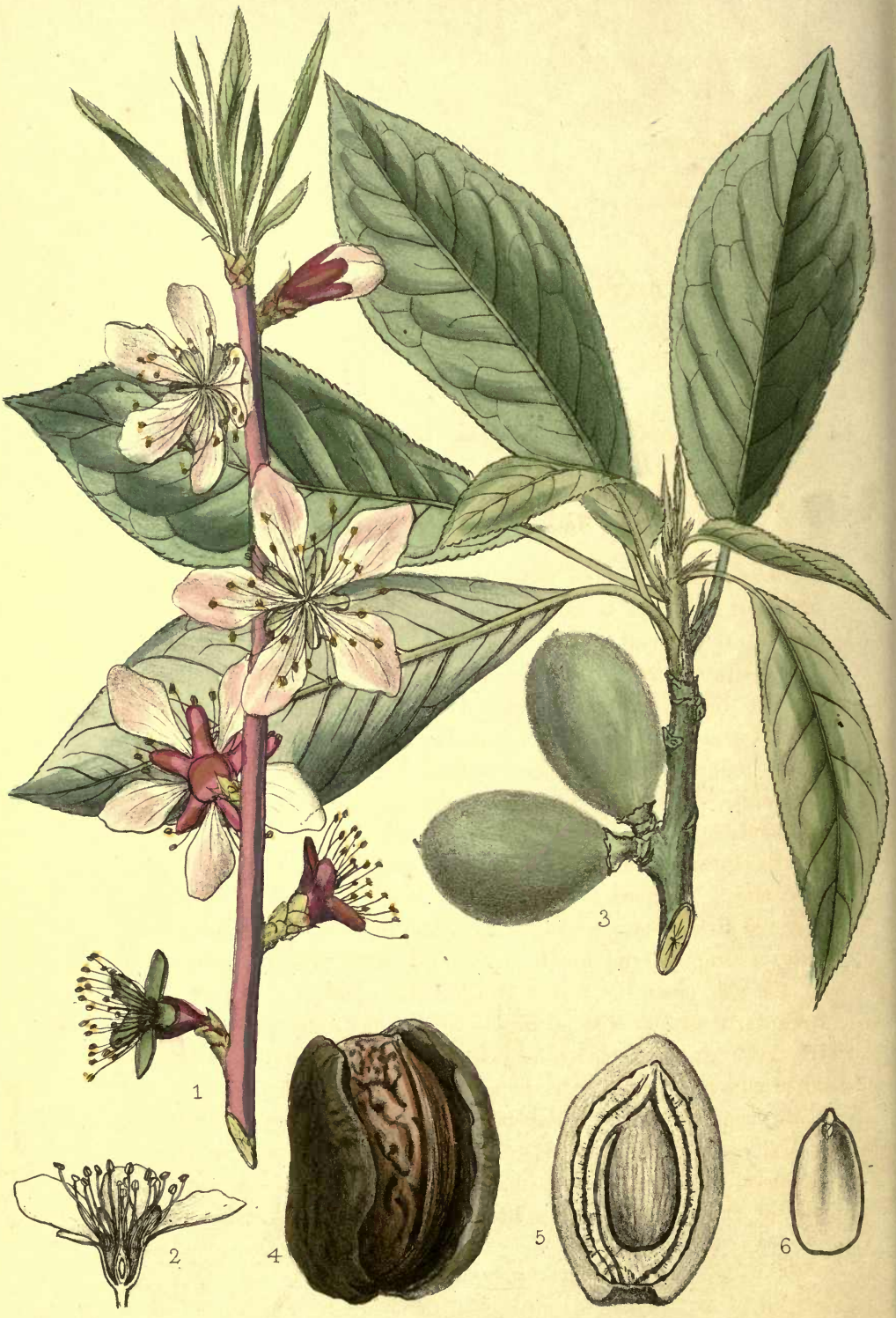
Pharmacographia, p. 139; Per. Mat. Med., vol. ii, part ii, p. 388; U. S. Disp., by W. and B., p. 728; Garr. Mat. Med., 4 ed., p. 229; Bentl., Man. Bot., p. 490; Ph. Jl., July 11, 1874, p. 21.

DESCRIPTION OF PLATE.

Drawn from a specimen in the garden of the Apothecaries' Company at Chelsea, assisted by a wild example from Box Hill, Surrey.

1. Branch with clusters of male flowers.
2. A male flower cut vertically.
3. Petal.
4. Stamen.
5. A female flower cut vertically.
6. Transverse section of ovary.
7. A branch with ripe fruit.
8. Base of fruit showing persistent base of calyx-tube.
9. Transverse section of fruit.
10, 11. Back of a single stone.
12. Front view of same.
13. Transverse section of same.
14. Back view of a seed.

(2—6 and 8—13 enlarged.)



D. Blair ad nat. del. et lith.

M & N. Hanhart imp.

PRUNUS AMYGDALUS, *Baill.*

N. Ord. Rosaceæ.
Tribe *Pruneæ*.
Genus Prunus, *Linn.*

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99. Prunus Amygdalus,* *Stokes, Bot. Mat. Med.*, iii, *p.* 101 (1812).

Almond.

Syn.—Amygdalus communis, *Linn.* and many authors. A. amara and A. dulcis, *DC., Fl. Franc.*

Figures.—Woodville, t. 183; Hayne, iv, t. 39; Steph. & Ch., t. 43; Nees, tt. 312 & 313; Berg & Sch., t. 4 d.

Description.—A small tree; bark pale purplish-brown, slightly wrinkled. Leaves broadly or narrowly lanceolate, acute, sharply serrate, thin, bright green, stalked, alternate, fasciculate on the short lateral branchlets, distant on the young terminal ones; stipules linear, acuminate, sharply serrate, deciduous. Flowers nearly sessile, solitary or few together on the sides of the previous year's branches, appearing just before the leaves, surrounded by a few scaly bracts. Calyx reddish, glabrous, the tube urceolate, the segments 5, broadly oblong, blunt. Petals 5, much larger than the calyx-segments, but variable in size, ovate, thin, concave, bright pale pink. Stamens about 30, about half the length of the petals, inserted at the margin of the calyx-tube in two rows. Ovary (and base of simple style) woolly, one-celled, with two ovules attached to the side near the top. Fruit a drupe about 1½ inch long, irregularly ovoid, with a furrow down one side, closely downy when young; sarcocarp leathery, irregularly splitting into two valves when ripe and falling away from the stone; endocarp hard, ovoid, acute, rugged with irregular pits and furrows externally, smooth and shining within. Seed solitary, about 1 inch long, somewhat compressed, pointed at top, blunt at lower end, connected with the side of the endocarp by a broad funicle; chalaza at the round

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* *Amygdalus*, the classical name.

end; testa reddish brown, thin, rough, with ramifying veins from the chalaza; embryo with a small blunt radicle, and two very large plane-convex cotyledons with the flat plumule between them; no endosperm.

There are no structural characters distinguishing the sweet and bitter almond trees, which cannot, therefore, in spite of the different qualities of their seeds, be separated, even as varieties; the bitter almond seed is somewhat smaller than the best varieties of the sweet kind.

Habitat.—The almond tree is considered to be a native of Morocco, Syria, Persia, and Turkestan; it is doubtfully wild in Sicily, Greece, and Anatolia, and is cultivated throughout temperate Europe, including England, where it ripens its fruit in the south only. As an ornamental, early-flowering tree it is very familiar, producing its beautiful flowers in March. The ovary is very frequently abortive, the flowers being practically male, in English gardens.

Amygdalus, as a genus, is distinguished from *Prunus* only by possessing a leathery separable shell in the place of a soft pulp connected with the stone. Boissier, in his 'Flora Orientalis,' describes 17 species.

Boiss., Fl. Orient, ii, p. 641; Seringe in DC. Prod., ii, p. 531; Lindl., Fl. Med., p. 231.

Official Parts and Names.—1. AMYGDALA DULCIS. The seed of the sweet almond tree, Amygdalus communis, *var.* dulcis, *DC;* 2. AMYGDALA AMARA. The seed of the bitter almond tree, Amygdalus communis, *var.* amara, *DC;* 3. OLEUM AMYGDALÆ. The oil expressed from bitter and sweet almonds (B. P.). 1. The seeds (*Amyydalæ dulces*); 2. The seeds (*Amygdalæ amaræ*) (I. P.). 1. AMYGDALA DULCIS. The kernel of the fruit; 2. AMYGDALA AMARA. The kernel of the fruit; 3. OLEUM AMYGDALÆ EXPRESSUM. The fixed oil obtained from the kernel of the fruit of Amygdalus communis; 4. OLEUM AMYGDALÆ AMARÆ. The volatile oil obtained from the kernel of the fruit of Amygdalus communis, variety amara (U. S. P.).

1. AMYGDALÆ DULCES. *Sweet Almonds.*—These seeds have a

bland, sweetish, agreeable, nutty taste, and when triturated with water they afford a pure white, milk-like emulsion of an agreeable taste, but without any marked odour. They are covered with a scurfy cinnamon-brown skin or testa; this is easily removed by maceration in warm water, together with the thin, closely attached endopleura or inner membrane, and the kernels, which are entirely formed of the embryo as already described, then alone remain. These are termed *blanched almonds.*

There are four varieties of sweet almonds now distinguished in the London market, namely, *Jordan, Valencia, Sicily,* and *Barbary,* which are arranged in the order of their value. The different kinds vary in the form and size of their kernels and in the firmness of their shells. When imported in the shell (endocarp) they are known as *almonds in the shell.*

Jordan Almonds are the finest kind; they are imported from Malaga, and generally without the shell. They differ from all the other varieties by their more oval shape and greater length; hence they are sometimes termed *long almonds.* Jordan almonds are alone official in the British Pharmacopœia, as is indicated by the characters there given and the statement that they come from Malaga.

The other varieties of sweet almonds are shorter and more ovate, resembling in these respects bitter almonds; indeed, it is principally on this account, and in order to guard against any admixture or substitution of bitter for sweet almonds, that Jordan almonds, which from their greater length cannot well be mistaken, are directed to be used in the British Pharmacopœia in the preparations of sweet almonds, which are ordered in that volume.

The principal constituents of sweet almonds are *fixed oil* (see *Oleum Amygdalæ*), *sugar,* and two albuminous substances called *synaptase* or *emulsin,* and *amandin,* which the recent experiments of Ritthausen tend to indicate, are both modifications of *casein.* It would seem also that sweet almonds must contain a very minute proportion of some substance analogous to *amygdalin* (see Amygdalæ Amaræ), as when warmed with solution of potash they yield a small quantity of hydrocyanic acid.

Medical Properties and Uses.—Sweet almonds are emollient and nutritive. They may be employed for the extraction of the fixed oil of almonds, but are rarely used for this purpose on account of their cost being greater than that of bitter almonds, and the residual cake of inferior value.

The principal use of the sweet almond in medicine is for making almond mixture, which is largely used as a demulcent and emollient in pulmonary affections, &c., and is an excellent vehicle for the administration of expectorants, saline refrigerants, &c. For dietetical purposes almonds are employed as a dessert, and for puddings, cakes, &c. When almonds are used for the table they should always be blanched, as their husk possesses irritant properties. An almond cake made from the non-amylaceous powder of the sweet almond has been recommended by Dr. Pavy as a substitute for bread in the treatment of diabetes.

2. Amygdalæ Amaræ. *Bitter Almonds.*—As already noticed, these almonds very much resemble in form and appearance the inferior kinds of sweet almonds, but are readily known from Jordan almonds by being less elongated and more ovate in form. They are distinguished from all kinds of sweet almonds by their bitter taste and by the emulsion which they afford when triturated with water, having a strong odour resembling ratafia, or peach-blossoms, which arises from the production under such circumstances of an essential oil and hydrocyanic acid.

There are three varieties of bitter almonds, namely, *French*, *Sicily*, and *Barbary*, which are placed in the order of their value.

Bitter almonds, like sweet almonds, contain a *fixed oil* (see *Oleum Amygdalæ*), *emulsin*, and *sugar*, but they also contain a crystalline substance called *amygdalin*, which is not a constituent of sweet almonds. It is, therefore, in the presence of this substance that bitter almonds owe their peculiar characteristics. The volatile oil and hydrocyanic acid which are developed when bitter almonds are triturated with water are not contained in these seeds, but are products resulting from the decomposition of amygdalin under the influence of emulsin and water, the emulsin acting as a kind of ferment.

Medical Properties and Uses.—Bitter almonds produce analogous effects to those of hydrocyanic acid; and may be therefore used medicinally in similar cases, but their administration is not desirable, as the amount of hydrocyanic acid generated is liable to great variation, and their effects, therefore, cannot be relied on with the same degree of certainty as those of hydrocyanic acid. In large quantities bitter almonds have caused serious and even fatal consequences, their poisonous effects being similar to those of hydrocyanic acid. In some persons, even in small quantities, they cause nausea, vomiting, purging, and a peculiar eruption like nettle-rash. The emulsion of bitter almonds is, however, a useful lotion in various skin diseases, as herpes, acne, prurigo, &c. Bitter almond paste is said to destroy the odour of camphor, musk, most volatile oils, creasote, &c., and has therefore been used to free mortars, &c., from the odour of assafœtida and other substances possessing a disagreeable smell.

Bitter almonds are also sometimes used for flavouring, scenting, &c., but their principal consumption is for expressing the fixed oil of almonds; the residual cake being also used when mixed with water for the distillation of the *volatile oil of bitter almonds* (see *Oleum Amygdalæ Amaræ*). *Almond powder* is the ground cake; this is employed as a soap for washing the hands and as a lute, &c. The cake after the volatile oil has been distilled may be used as a food for pigs, &c.

3. Oleum Amygdalæ. *Almond Oil.*—Although, as already mentioned, both sweet and bitter almonds are official as sources of almond oil in the British and other pharmacopœias, the oil of commerce is almost exclusively obtained from bitter almonds on account of their less cost and the greater value of their residual cake. The produce of oil is, however, somewhat less from bitter than sweet almonds, for while the latter yield commonly 50 per cent. of oil, the former, according to Umney, only yield about 44 per cent. The oil is rarely expressed in the United States, but is usually imported from Europe. The properties and composition of the oil are the same, whether derived from sweet or bitter almonds. Almond oil is a thin, pale-yellow fluid,

of a specific gravity varying from 0·912 to 0·920, and when fresh it is almost or entirely inodorous, and has a mild, oleaginous, nutty taste. It congeals less readily than olive oil. It is composed almost wholly of oleic acid combined with glycerin. It soon becomes rancid by exposure to the air.

Medical Properties and Uses.—Almond oil possesses the medicinal and dietetical properties of fixed oils generally. When applied locally it is emollient, and when taken in small quantities it is nutritive, and in large doses laxative. It may be employed for the same purposes as olive oil, and when made into an emulsion with mucilage, or yolk of eggs and sugar, it may be used in allaying troublesome cough, &c.

In pharmacy it is employed in the preparation of several of the official ointments.

4. Oleum Amygdalæ Amaræ. *Volatile Oil of Bitter Almonds.*—This oil has already been referred to under the head of Amygdalæ Amaræ as resulting from the decomposition of amygdalin under the influence of emulsin and water, and stated to be obtained by submitting the bitter almond cake left after the expression of the fixed oil to distillation with water, either alone or more commonly with salt. The yield of volatile oil, as shown by the experiments of Umney, is liable to great variation, the amount obtained by him being, in some cases, as much as 0·95 per cent., while in others it was only 0·42 per cent. This volatile oil is a mixture or compound of various substances, as *hydride of benzoyl, hydrocyanic acid, benzoine,* and *benzamide,* and is commonly known as *crude oil of bitter almonds.* It is this oil which is official in the Pharmacopœia of the United States. It has a golden-yellow colour, and varies in sp. gr. from 1·052 to 1·082. Umney gives it from 1·061 to 1·065. This crude oil is highly poisonous on account of the hydrocyanic acid which it contains, the proportion of which, however, varies from 8 to 14 per cent. The hydrocyanic acid is frequently separated by manufacturers from the crude oil, and the oil is then supplied as *oil of bitter almonds free from hydrocyanic acid,* or *purified oil of bitter almonds.* Various processes have been given by different chemists for the separation of hydrocyanic

acid, but all these purified oils are liable to oxidation unless agitated with fused chloride of calcium so as to deprive them of water. Umney gives the sp. gr. of the purified oil as 1·049.

Medical Properties and Uses.—The effects of the unpurified or crude oil of bitter almonds are almost identical with those of hydrocyanic acid, but as the proportion of hydrocyanic in different oils is liable to great variation, it is very rarely or never employed in medicine in this country, although sometimes prescribed both for external and internal use in the United States of America.

The volatile oil of bitter almonds is very largely used for flavouring by the cook and confectioner; and by the perfumer for scenting toilet soap, and for other purposes. When used for flavouring the purified oil ought always to be employed on account of the dangerous poisonous properties of the crude oil. For this purpose an essence of bitter almonds or almond flavour is commonly supplied, which may be prepared by adding one volume of the purified oil to three volumes of rectified spirit.

Per. Mat. Med., vol. ii, pt. 2, pp. 244 and 250; Pharmacographia, pp. 218—221; U. S. Disp., by W. and B., pp. 117, 588, and 590; Per. Mat. Med., by B. and R., pp. 808—811.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in the Royal Gardens, Kew.

1. A flowering shoot.
2. Vertical section of a flower.
3. A branch with young fruit.
4. Ripe fruit with the sarcocarp split away.
5. Section through fruit to show the seed.
6. Seed with one cotyledon removed.

D. Blair ad nat. del et lith.

M&N Hanhart imp.

PYRUS CYDONIA. *Linn.*

N. Ord. Rosaceæ.

Tribe *Pomeæ*. Lindl., Veg. Kingd., p. 559 (N. Ord. *Pomaceæ*).

Genus Pyrus, *Linn.** B. & H., Gen. I, t. 626; Baill., l. c., pp. 392 & 463. Species about 40, natives of the temperate regions of the northern hemisphere.

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106. Pyrus Cydonia,† *Linn., Sp. Pl., ed.* 1, *p.* 480 (1753).

Quince.

Syn.—Cydonia vulgaris, *Pers. & other authors.* C. europæa, *Savi.* Sorbus Cydonia, *Crantz.*

Figures.—Woodville, t. 182; Hayne, iv, t. 47; Steph. & Ch., t. 115; Nees, t. 305; Berg & Sch., t. 46 c; Berg, Charact., t. 63, f. 479; Bot. Reg., t. 905; Jacq., Fl. Austr., t. 312.

Description.—A bush or small tree with spreading branches, the bark purplish-brown, thin, the young twigs covered with a dense, yellowish-grey tomentum. Leaves shortly stalked, entire, ovate, blunt or acute, 1½—2½ inches long. Stipules roundish or oblong-oval, serrate and denticulate, with marginal glands; petioles and under surface densely covered with short, thick, yellowish wool, which when the leaves are young also covers their upper surface. Flowers usually solitary at the ends of the branches, with several bracts at the base of similar form to the stipules. Calyx-tube globular-ovoid, densely tomentose. Teeth 5, large, oval-oblong, acute, glandular-serrate, foliaceous, reflexed during flowering, persistent. Corolla of 5 petals, more than 2 inches across. Petals round-obovate, woolly at the base, white or pink. Stamens about 20 in two rows, the inner ones shorter, inserted on the prominent rim of the calyx-tube (hollow receptacle). Ovary surrounded by the thick "calyx-tube," 5-celled, ovules numerous in two rows in each cell, ascending; styles 5, densely woolly below; stigmas capitate. Fruit a large pome, woolly when young, some-

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* *Pyrus*, a pear tree; the classical name.

† From Κυδώνια, a town in Crete, where, according to Pliny, this shrub was indigenous.

times apple-shaped, more usually pyriform, bright golden yellow, very fragrant, crowned with the persistent leafy calyx-segments; flesh yellowish; endocarp cartilaginous, surrounding the cells. Seeds about 12 or 14 in each cell, somewhat coherent and flattened by mutual pressure, pointed at the hilum, and marked on one side at the other end by the chalaza, with a ridge, the raphe, connecting these two points; testa brown, cartilaginous, covered with an epidermal layer of a single row of cylindrical cells, which swell up into a mucilage if treated with water; embryo entirely filling the seed, cotyledons large, radicle prominent, pointing to the hilum.

Habitat.—The native country of the quince is doubtful, but, like so many other fruits, it appears to be wild in some of the Caucasian provinces, Persia and Asia Minor. It was very anciently cultivated, and is now found apparently wild throughout the Mediterranean region, and in gardens in all temperate parts of Europe, and many parts of Asia and America. It produces fruit abundantly in the South of England.

Cydonia as a genus differs from *Pyrus* (in which it is now usually included) only in the cells of the fruit containing numerous seeds instead of two. Four species are known. The structure of the seed-coat is figured in Berg's 'Characteristik' quoted above.

DC. Prod., ii, p. 638; Boiss, Fl. Orient., ii, p. 656; Wenzig in Linnæa, xxxviii (1873), p. 7; Gren. & Godr., Fl. France, i, p. 569; Lindl., Fl. Med., p. 234.

Official Part and Name.—Cydonium. The seed (U. S. P. *Secondary*). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

Commerce.—Quince seeds are imported into England from the South of France, from the Cape of Good Hope, and from Hamburg, where they are known as Russian quince seeds. They are largely imported into India from the Persian Gulf, and by land from Affghanistan.

General Characters and Composition.—Quince seeds of commerce are flattened, ovate, acute, more or less angular, and mahogany or reddish-brown in colour. They have no odour, and only a simply

mucilaginous taste when unbroken, but when bruised and rubbed up with water the kernels have the odour and taste of bitter almonds, from the formation of hydrocyanic acid.

The seed-coats contain so large a quantity of mucilage that it is said that the seed readily coagulates forty times its weight of water. Pereira considers this mucilage as peculiar, and calls it *cydonin*. Hanbury and Flückiger regard it as a soluble modification of cellulose.

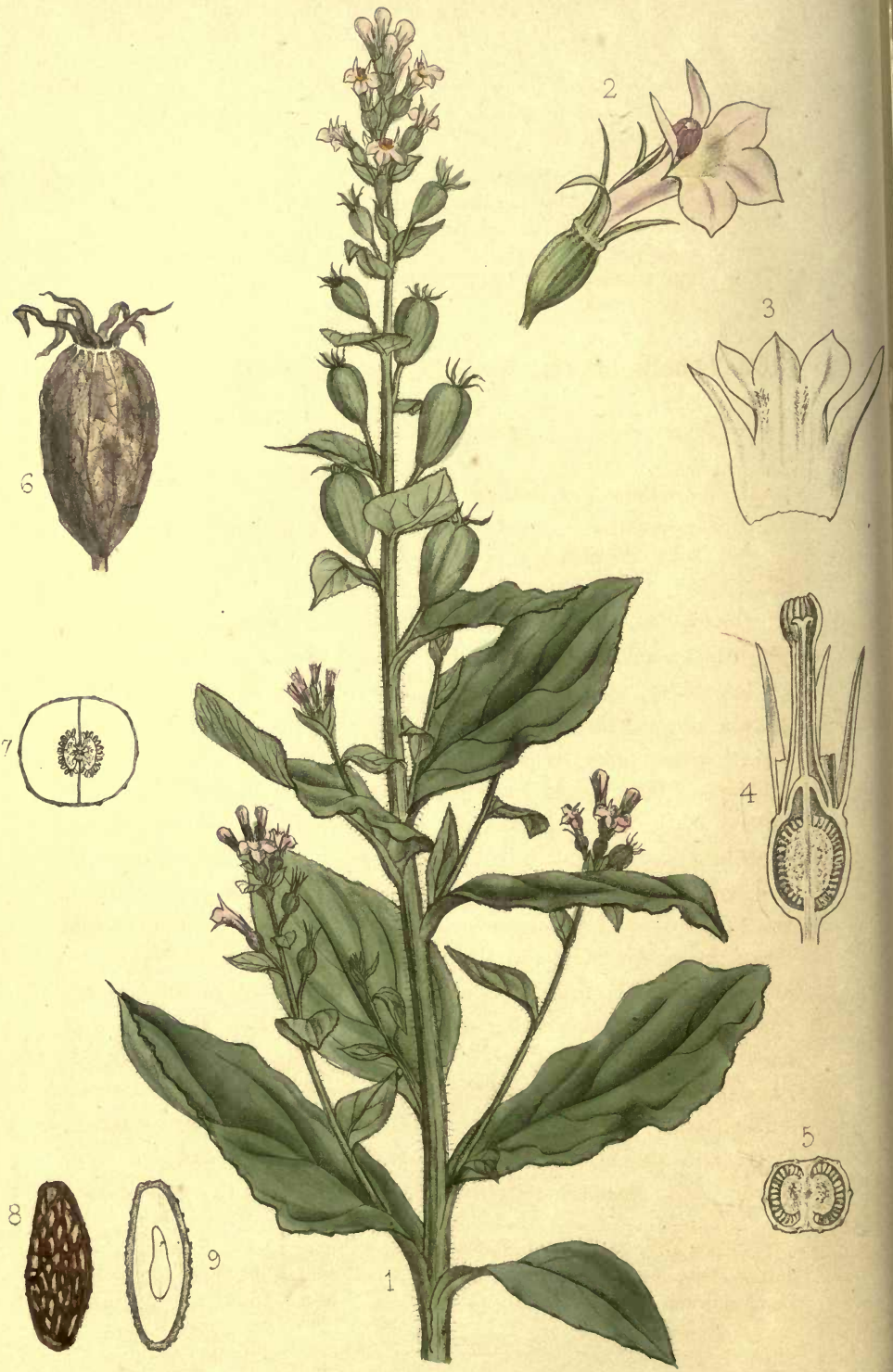
Medical Properties and Uses.—Quince seeds are only employed in medicine on account of their mucilage, which possesses emollient and demulcent properties. In this country they are only used externally in the form of a decoction, which is commonly known as mucilage of quince seeds, as a demulcent in skin diseases, affections of the eye, erysipelas, and other cases where mucilaginous applications are useful. In the United States infusion of sassafras pith is preferred to quince mucilage in such cases. Quince seeds are highly valued by the Mahomedans in India and all over the East, as a demulcent tonic and restorative. Europeans have also employed them with success in dysentery. The mucilage of quince seeds is one of the substances used by hair-dressers under the name of *bandoline*, for dressing the hair, &c.

Quince fruit must be carefully distinguished from Indian Bael fruit, which is known in India as the Bengal quince. Quince fruit is not eatable in its raw state on account of its strong odour and astringent taste, but when stewed in pies and tarts with apples it is much esteemed. An excellent marmalade is also prepared from the pulp (*miva cydoniarum*); indeed, it is said that the name of marmalade was originally derived from *marmelo*, the Portuguese name of the quince.

Pharmacographia, p. 240; Per. Mat. Med., vol. ii, part 2, p. 304; Per., by B. & R., p. 826; U. S. Disp., by W. & B., p. 358; Pharm. of India, p. 86.

DESCRIPTION OF PLATE.

Drawn from a plant in the Royal Gardens, Kew. 1. Branch with foliage and young flowers. 2. Vertical section of flower, petals omitted. 3. Transverse section of ovary. 4. Ripe fruit. 5. Section of same. 6, 7. Seed. 8. Vertical section of same. (2, 3, 7, 8 enlarged.)



D Blair. ad nat. del. et lith.

M & N Hanhart imp

LOBELIA INFLATA *Linn.*

N. Ord. LOBELIACEÆ. Lindl., Veg. K., p. 692; Le Maout & Decaisne, p. 512.

Tribe *Lobelieæ*.

Genus Lobelia, *Linn.** Alph. DC. in DC. Prod., vii, pp. 357—391. Species 170 or more, natives, of the warmer regions chiefly, of both hemispheres; especially frequent in America and at the Cape of Good Hope.

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162. Lobelia inflata, *Linn.*, in *Act. Upsal.* 1741, *p.* 23.

Indian Tobacco.

Syn.—Rapuntium inflatum, *Mill.*

Figures.—Barton, t. 16; Bigelow, t. 19; Nees, t. 206; Berg & Sch., t. 1 a; Pereira, Mat. Med., p. 1546 (seed).

Description.—An erect annual or biennial herb, 1—2 feet high, slightly branched above. Roots fibrous, stem round, striate, more or less hairy. Leaves alternate; lowest ones stalked, the others sessile; slightly decurrent, thin, light green, pilose on both surfaces, 1½—3 inches long, broadly or narrowly oval, denticulate or erose, obtuse. Inflorescence branched below; lower bracts large, leafy; flowers stalked, erect, small, in upright racemes; pedicels shorter than bracts. Calyx-tube united with ovary, marked with 10 veins, and with a prominent ring below the teeth; teeth 5, longer than the tube, linear, tapering, acute, glabrous. Corolla tubular, split down the centre above to the very base; bilabiate, the upper lip of two narrow, lanceolate, erect segments, the lower of three nearly equal, spreading, triangular-ovate lobes with two short lines of hairs within, pale violet-blue, the lower lip yellowish within. Stamens 5, epigynous, not adherent to corolla; both filaments and anthers united into a tube surrounding the style. Ovary inferior, ovoid, two-celled, with numerous ovules closely packed on large, spongy, axile placentas; style simple; stigmas 2, with a tuft of hair

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* Named after Matthias de Lobel, "botanographer to King James I," and author of some valuable works. He was a native of Lille, but lived much in London, where he died in 1616.

below, enclosed in the tube of the anthers. Fruit inflated, obovoid or nearly globular, crowned by the persistent sepals and remains of the corolla; pericarp very thin when ripe, papery and crumpled, pale brown, 2-celled, indehiscent or opening irregularly at the summit. Seeds very numerous, exceedingly small, oblong-ovoid, rich orange brown, with a raised network of golden yellow; embryo straight in axis of the endosperm.

Habitat.—Found in dry places throughout the northern United States, and extending northward to Hudson's Bay and Saskatchawan, and southward to Mississippi. It also occurs in Kamtschatka. It readily grows in English gardens, but has little beauty to recommend it in comparison with many other species of the genus.

Hook., Fl. Bor. Am., ii, p. 30; A. Gray, Man. Bot. U. S., p. 283; Chapman, Fl. South States, p. 254; Alph. DC., l. c., p. 380; Lindl., Med. Bot., p. 403.

Official Part and Name.—LOBELIA. The dried flowering herb (B. P.). The flowering herb (*Lobelia*) (I. P.). LOBELIA. The leaves and tops (U. S. P.).

Commerce.—The herb is imported into England from North America, usually in the form of compressed, oblong, rectangular cakes or packages, weighing from half a pound to a pound each, and from 1 to $1\frac{3}{4}$ inches thick. These packages are wrapped in paper sealed at the ends, and properly labelled with the name of the herb and of some herb-grower; they are usually prepared by the Shakers of New Lebanon. Lobelia is also occasionally found in commerce in an uncompressed state.

General Characters and Composition.—Lobelia of commerce, both from the packages and in an uncompressed state, consists of the dried herb cut up into pieces of varying sizes. Its colour is yellowish green; its odour somewhat irritating; and its taste after being chewed burning and acrid, very similiar to that of tobacco, and causing, like it, a flow of saliva. The powder has a greenish colour.

Lobelia seeds, from forming one of the best means for detecting

lobelia when death has been occasioned by its improper use, which has frequently happened, require a more detailed description. They have a brownish colour, and are very small, being on an average only $\frac{1}{30}$th of an inch long, by $\frac{1}{75}$th broad, and when viewed by a magnifying lens are seen to be oval or almond-shaped, and to have their surface marked with longitudinal and transverse ridges with intervening furrows, so as to resemble basket-work. Their powder is of a brownish colour, and communicates a greasy stain to paper.

The properties of lobelia are especially due to a liquid volatile alkaloid, which was first discovered by Professor Procter, who named it *lobelina*, and his observations were afterwards confirmed by Bastick in this country in ignorance of his experiments. The herb also contains traces of volatile oil, which was first obtained by Pereira and named by him *lobelianin*. Lobelia has also been examined by Enders at the desire of the authors of Pharmacographia, with a view to isolate the acrid principle to which it owes its taste, and he has discovered this substance in the form of warty tufts of a brownish colour. This has been termed *lobelacrin*; it is resolved by the influence of acids or alkalies into sugar and an acid called *lobelic acid*, which had been previously discovered by Pereira and afterwards examined by several chemists.

Medical Properties and Uses.—In *small doses* lobelia is expectorant and diaphoretic; in *full medicinal doses* it acts as a nauseating emetic; and in *excessive doses* its effects are those of a powerful acro-narcotic poison, producing great depression, nausea, cold sweats, and in some cases death. Its effects are very similar to those of tobacco; hence one of its commonest names, Indian tobacco. Waring says, as an emetic it is inferior to ipecacuanha in safety and certainty of operation. It is regarded by many as a medicine of much value in spasmodic asthma, and generally in affections of the air-passages where there is dyspnœa. As an addition to diuretic medicines it is believed by some practi-

tioners to have a useful effect. As a medicine lobelia should in all cases be employed with caution.

Per. Mat. Med., vol. ii, pt. ii, p. 9; Pharmacographia, p. 358; Per., by B. & R., p. 677; U. S. Disp., by W. & B., p. 533; Pharm. of Ind., p. 128.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Garden of the Apothecaries' Company, Chelsea.

1. Upper part of a plant.
2. A flower.
3. Corolla flattened out.
4. Vertical section of flower, corolla cut off.
5. Transverse section of ovary.
6. Ripe fruit.
7. Transverse section of same.
8. Seed.
9. Vertical section of same.

(2—7 enlarged; 8, 9 much magnified.)

D. Blair ad nat del et lith.

M. & N. Hanhart imp.

GAULTHERIA PROCUMBENS. *Linn.*

N. Ord. Ericaceæ.

Tribe *Andromedeæ*.

Genus Gaultheria, *Kalm.** DC. Prod., vii, pp. 592—597.
Species 43, natives chiefly of America, a few Indian.

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164. Gaultheria procumbens, *Linn., Sp. Pl., ed.* 1, *p.* 395 (1753).

Wintergreen. Mountain Tea. Tea-berry. Checker-berry. Partridge-berry. Box-berry. Jersey Tea. Spice-berry. Ground Holly.

Syn.—G. humilis, *Salisb.* Gautiera repens, *Rafinesque.*

Figures.—Barton, t. 15 (not good); Bigelow, t. 22; Andr., Bot. Repos., t. 116; Bot. Mag., t. 1966.

Description.—A small creeping shrub; stem long, prostrate, very slender, with brown scaly bark, giving off root-fibres below, and above numerous erect branches, 3—6 inches high, naked and glabrous below, downy and with crowded leaves above. Leaves alternate, shortly stalked, 1—1½ inches long, oval but varying somewhat in width, tapering at base, acute at apex, thick, smooth, shining, sharply serrate, the serratures bristle-tipped. Flowers few, solitary from the leaf-axils; pedicels shorter than flowers, curved downwards, so that the flowers are pendulous, with two small broad bracts immediately below the calyx, crimson. Calyx saucer-shaped, deeply cut into 5 broad acute segments. Corolla urceolate, narrowed at the mouth, with 5 small spreading teeth, pale pink, waxy-looking, hairy within. Stamens 10, hypogynous, entirely included in the corolla; filaments curved, hairy; anthers 2-celled, each cell prolonged above into 2 awns, opening by a terminal pore. Ovary depressed, 5-lobed, smooth, 5-celled, surrounded at the base by a 5-lobed hypogynous disk, placentation axile; style simple, thick, longer than stamens. Fruit bright crimson-red, berry-like, sub-globular, the exterior formed

* Named to commemorate Dr. Gaultier, a physician of Quebec in the 18th century.

of the greatly enlarged and fleshy calyx, which surrounds the small thin-walled capsule, 5-celled. Seeds numerous, attached to the axis, small, slightly reticulated on the surface, embryo in the axis of fleshy endosperm.

Habitat.—This pretty little creeping shrub grows in shady woods, on sandy soil, especially in mountainous districts, in the southern parts of Canada and the northern United States, extending as far south as North Carolina. It is especially abundant in the pine-barrens of New Jersey. The whole plant has a pleasant aromatic flavour, and is evergreen, but the leaves frequently assume brilliant autumnal colouring. The structure of the so-called berry is very singular; the capsule itself is described by American writers as dehiscent with 5 valves; Salisbury considers it to be indehiscent, but rotting and crumbling away, when the placentas easily fall away from the axis. The plant was introduced into England by P. Miller in 1762 and is quite hardy here, flowering and fruiting almost throughout the year.

DC. Prod., l. c., p. 592; Hook., Fl. Bor. Am., ii, p. 35; A. Gray, Man. Bot. U. S., p. 293; Chapman, Fl. South. States, p. 261; Lindl., Med. Bot., p. 381.

Official Part and Name.—GAULTHERIA. The leaves (U. S. P.). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—The botanical characters of these leaves have been already given. They have a very peculiar, aromatic, agreeable odour and taste, and a marked astringency.

The aromatic properties reside in a volatile oil, which may be separated by distillation. It is commonly known in England under the name of Oil of Winter Green. A similar oil may be obtained from the bark of *Betula lenta* or Sweet Birch, and is also supposed to exist in other plants. It is the heaviest of all the known essential oils, having the sp. gr. 1·173, which character affords a convenient test of its purity. Gaultheria also contains tannic acid, to which its astringency is due.

Medical Properties and Uses.—Gaultheria possesses aromatic, stimulant, and astringent properties, and has been employed with benefit in chronic diarrhœa. It has also been used, but with doubtful advantage, as an emmenagogue, and with the view of increasing the secretion of milk. Oil of Gaultheria or Winter Green also possesses aromatic and stimulant properties, but it is chiefly used on account of its agreeable flavour to cover the unpleasant taste of other medicines.

Besides their medicinal use, an infusion of the leaves is employed in some parts of North America as a substitute for China tea, under the name of *Mountain* or *Salvador Tea.*

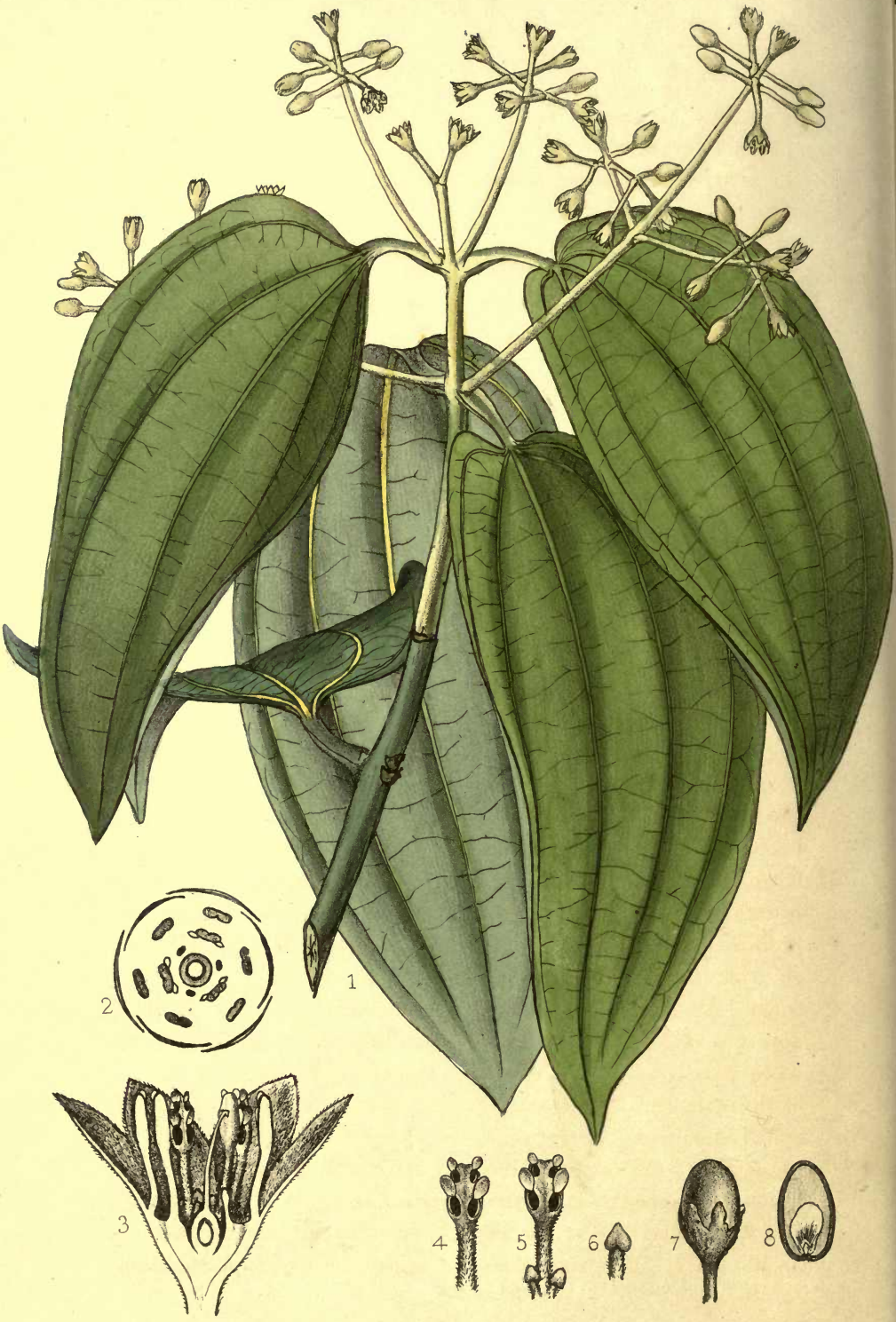
The fruits under the name of Partridge berries or Deer berries are much relished by some persons, and afford winter food to partridges, deers, and other wild animals.

Per. Mat. Med., vol. ii, pt. 2, p. 7; U. S. Disp., by W. & B., pp. 420 and 1307.

DESCRIPTION OF PLATE.

1. A flowering branch from the Garden of the Apothecaries' Society.
2. A branch with fruit from the Royal Gardens, Kew.
3. A flower.
4. Vertical section of the same.
5. Vertical section of ovary.
6. Transverse section of ovary.
7. A stamen.
8. Fruit.
9. The same with the enlarged calyx partly removed.
10. Transverse section of same.
11. Seed.

(4—7, 10 and 11 enlarged.)



D.Blair ad.nat.del.et lith.

M.&N.Hanhart imp.

CINNAMOMUM ZEYLANICUM, *Breyn.*

N. Ord. LAURACEÆ.
Tribe *Laurineæ*.
Genus Cinnamomum, *Burman*.

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224. Cinnamomum zeylanicum, *Breyn. in Ephem. Acad. Nat. Cur., Dec.* 1, *ann.* 4, *p.* 139, 140 (ex Hayne).

Cinnamon.

Syn.—Laurus Cinnamomum, *Linn. & many authors.* L. Cassia, *Burm. and other authors; not of Nees.*

Figures.—Steph. & Ch., t. 127; Nees, t. 128; Hayne, xii, tt. 20, 21; Berg & Sch., t. 5 c; Bot. Mag., t. 1636; Wight, Ic. Pl. Ind., tt. 123—128; Bedd., Fl. Sylv., t. 262 (*C. Wightii*, Meissn.).

Description.—An evergreen tree, usually of small size; bark pale-brown; the young twigs slightly quadrangular, smooth. Leaves opposite, spreading or drooping, stalked; the pedicels channelled above; blade 4-6 inches long, oblong-ovate, rounded at the base, bluntly acuminate at the apex, but often somewhat irregular in outline, coriaceous, shining, bright green above, glaucous beneath, with 3 or 5 strong nerves from the base, only the midrib reaching the apex, especially prominent beneath, connected by transverse anastomosing veins, entire. Inflorescence large, terminal, definite, panicled, much branched, the lower branches coming off from the axils of the upper leaves; ultimate branchlets di- or trichotomous; flowers rather distant, terminal, ebracteate. Perianth deeply divided into 6 oblong, rather blunt, equal lobes, imbricated in two rows, about ¼ inch long, finely downy outside, more densely so within; the upper half of the lobes usually breaking away by a transverse fission from the rest of the perianth. Androecium consisting of 9 antheriferous stamens and 3 staminodes, perigynous, the outer whorl of 6 opposite the segments of the perianth, introrse, the inner whorl of 3 opposite the outer segments, extrorse and with a small, stalked, obcordate-conical "gland" on either side of the filament at its base, filaments hairy, short, anthers oval with 4 cells, 2 placed above

the others and smaller, each opening by a valve with its hinge above; staminodes opposite the inner perianth-segments, similar in form to the "glands" at the base of the inner stamens, but larger. Ovary superior, 1-celled, with a single pendulous, anatropous ovule; style shorter than the stamens; stigma bilobed. Fruit slightly fleshy, ovoid, more than ½ inch long, smooth, surrounded at base by the enlarged, cup-shaped, truncate or 6-lobed perianth. Seed not filling the fruit, without endosperm; cotyledons large, plano-convex.

The above description applies to the form which is considered by botanists as the type of the species; but there are various cinnamon trees differing in height, in the form, size and texture of the leaves, and in other points. Meissner makes 6 varieties of the present species, and gives also many other allied species which have been described by various authors; but it is now generally considered (see Thwaites and Beddome) that many of these cannot be maintained as distinct, being united by chains of intermediate forms. Figures of several will be found in the works quoted above of Hayne, Nees, and Wight.

Habitat.—*C. zeylanicum*, as its name indicates, is a native of Ceylon, where it is general in forest districts, reaching to 3000 ft. in the hills, and is also very extensively cultivated in plantations, called "gardens." It has been introduced into India, Java, China, Senegal, Brazil, and the West Indies, but the bark yielded in those countries is deficient in aromatic qualities. It is a stove plant in England, where it has been cultivated since 1768 in botanic gardens; the panicles of flowers are small compared with naturally grown specimens.

Thwaites, Enum. Pl. Zeyl., p. 252; Meissner, in DC. Prod., xv, sect. 1, p. 13; Miquel, Fl. Ind. Batav., i, p. 898; Lindl., Fl. Med., p. 329.

Official Parts and Names.—CINNAMOMI CORTEX. The inner bark of shoots from the truncated stocks; OLEUM CINNAMOMI. The oil distilled from Cinnamon Bark (B. P.). The inner bark of shoots from the truncated stocks (*Cinnamomi Cortex*) (I. P.).

CINNAMOMUM. The prepared bark of Cinnamomum zeylanicum, *Nees*, and of Cinnamomum aromaticum, *Nees*; OLEUM CINNAMOMI. The volatile oil obtained from the bark of Cinnamomum zeylanicum, *Nees* (U. S. P.).

Production, Varieties, and Commerce.—The best cinnamon bark is imported from Ceylon, where it is obtained from the cultivated plant; this is distinguished in commerce as Ceylon cinnamon. Other well known varieties of cinnamon bark are the *Malabar* or *Tinnevelly*, *Tellicherry*, and *Java*, all of which are inferior to Ceylon cinnamon; but the Tellicherry is next in value to it, and sometimes but little inferior in quality. In Ceylon the cultivation of coffee is displacing that of cinnamon, and the exports are declining. The importations of cinnamon into this country from Ceylon are also much less than formerly, for while in 1869 2,611,473 lbs. were imported, in 1872 the quantity was only 1,015,461 lbs. In the latter year we imported 56,000 lbs. of cinnamon from other countries.

The principal cinnamon gardens or plantations of Ceylon are in the vicinity of Columbo, and their management is nearly similar to that of an oak-coppice in England. The plants are pruned so as to prevent their forming trees, but to cause them to produce stocks or stools, from which four or five shoots are allowed to grow. These shoots usually come to perfection at the age of from eighteen months to two years, when they are beginning to turn brown on their surface from the greenish epidermis becoming replaced by the production of a corky layer of bark. Such shoots, which are commonly from 6 to 10 feet high, and from ½ to 2 inches thick, are then cut off by a long sickle-shaped knife, called a *catty*, stripped of their leaves, and trimmed with a knife, the little pieces which are removed being kept and sold as *cinnamon chips*. The peeling is then effected by cutting through the bark transversely at distances of about a foot, and by making two opposite, or where the branch is thick, three or four longitudinal incisions to connect the transverse ones, and the bark is then readily removed by introducing the peeling knife termed a *mama* beneath it. The pieces of bark are then placed one within

the other, and the compound sticks thus produced are bound together into bundles. These are usually left for about twenty-four hours, when the two external layers of bark are carefully removed by scraping; for which purpose each quill is placed on a piece of wood of the required thickness. In a few hours the smaller quills are introduced into the larger ones, and in this way congeries of quills are formed, which generally measure about 40 inches in length. The bark is then kept one day in the shade, after which it is placed on wicker trays and dried in the sun; and finally it is made up into bundles weighing on an average about 30 lbs. each. Care is taken to fill up each pipe or congeries of quills with the same kind of bark as that which is outside, and as few joints are placed in each pipe as possible. The finest pipes are usually well filled, as the preservation of the odour and flavour is very much assisted by the exclusion of the air.

General Characters of Cinnamon Bark.—The bark of commerce, —that which is alone official in the British and Indian Pharmacopœias, is Ceylon cinnamon. In the United States Pharmacopœia both true Cinnamon bark and Cassia bark there mentioned as obtained from *Cinnamomum aromaticum*, Nees, (see *Cassia Bark*,) are official under the common name of cinnamon bark. The official cinnamon bark of the British Pharmacopœia consists essentially of the inner bark or *liber*, and presents the following characters:—It is in closely rolled quills, each being about $\frac{3}{8}$ of an inch in thickness and containing several smaller quills. The bark is thin, brittle, splintery, moderately pliable, of a dull, light yellowish-brown colour externally, and of a darker brown on its inner surface. The outer surface presents at varying distances little scars or holes indicating the points where the leaves have been removed, and is also marked with faint, shining, wavy lines. The odour is fragrant, and the taste warm, sweet, and aromatic. These are the characters of the best Ceylon cinnamon; inferior kinds are thicker, darker-brown, and have a pungent succeeded by a bitter taste. The means of distinguishing cinnamon from cassia bark, which is frequently substituted for it, are described under Cassia bark.

The essential constituent of cinnamon bark is the *volatile oil*, which is official in the British and Indian Pharmacopœias. It is also official in the United States Pharmacopœia; and although, as already noticed, no difference is there made between cinnamon and cassia barks, the volatile oil is directed to be derived from the bark of *Cinnamomum zeylanicum* alone. Oil of cinnamon is imported from Ceylon. When fresh it has a golden-yellow colour, but by keeping, owing to oxidation, it becomes contaminated with resin and cinnamic acid, and changes to cherry-red. Its sp. gr. is 1·1035; it has a pleasant and purely cinnamomic odour, and a sweetish cinnamomic and burning taste. Oil of cassia is sometimes substituted for or mixed with the finer and more costly oil of cinnamon.

Medical Properties and Uses.—Cinnamon bark has generally the properties of the spices, being aromatic, carminative, and stimulant. It is also somewhat astringent. It is rarely prescribed alone, but chiefly as an addition to other medicines, to improve their flavour or to check their griping qualities. As a cordial, stimulant, and tonic, it is indicated in all cases characterised by feebleness and atony. As an astringent it is employed in diarrhœa, usually in combination with chalk, the vegetable infusions, or opium. As a cordial and stimulant it is exhibited in the latter stages of low fever. In flatulent and spasmodic affections of the alimentary canal it often proves a very efficient carminative and antispasmodic. It checks nausea and vomiting. It has also been used in uterine hæmorrhage.

The oil of cinnamon possesses the cordial and carminative properties of the bark without its astringency, and is a good deal used as an adjunct to other medicines, and also as a powerful local stimulant in paralysis of the tongue, cramp of the stomach, and to relieve headache, &c.

The principal consumption of cinnamon is, however, as a spice, and we have already alluded to it as the chief flavouring agent for chocolate.

An oil of a clove-like odour and taste is also distilled from the leaves of the cinnamon plant in Ceylon, and occasionally

imported; and the substance called Cinnamon suet is also expressed in Ceylon from the ripe fruits.

Pharmacographia, p. 470; Per. Mat. Med., by B. & R., p. 541; U. S. Disp., by W. & B., pp. 312 and 595; Per. Mat. Med., vol. ii, pt. 1, pp. 439—441; Bentl., Man. Bot., p. 611.

DESCRIPTION OF PLATE.

Drawn from a specimen cultivated in the Royal Gardens, Kew; the fruit added from a specimen collected by Thwaites in Ceylon (n. 2284).

1. Young branch with flowers.
2. Diagram of flower.
3. Vertical section of flower.
4. An outer stamen.
5. An inner stamen.
6. A staminode.
7. Fruit.
8. Section of fruit.

(3—6 enlarged; 8 copied from Wight, l. c.)

D. Blair ad nat. del. et lith.

M&N. Hanhart imp.

PAPAVER RHŒAS, *Linn*

N. Ord. PAPAVERACEÆ.
Tribe *Papavereæ*.
Genus **Papaver**, *Linn.*

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19. Papaver Rhœas,* *Linn., Sp. Pl., ed.* i, *p.* 507 (1753).

Red Poppy. Corn Poppy. Corn Rose.

Figures.—Woodville, t. 139; Hayne, vi, t. 38; Steph. & Ch., t. 31; Nees, t. 406; Berg & Sch., t. 15 f; Curt., Fl. Lond., fasc. 3; Syme, E. B., i, t. 58.

Description.—An erect annual, 1—3 feet high, with a slender, more or less branched, round, green, hispid or bristly stem, the bristles stiff, spreading; branches erect. Root vertical, tapering, slightly branched. Root-leaves stalked, obovate-lanceolate in outline, deeply pinnatisect with lanceolate distant segments irregularly cut into ascending lobes tipped with bristles; stem-leaves sessile or amplexicaul, triangular in outline, the segments narrower, bright green, hairy on both sides. Flowers solitary, at the ends of the stem and branches, on long stalks, hispid with stiff spreading hairs; buds obovoid, drooping. Sepals 2, articulating with the receptacle and pushed off the top of the flower by the expanding petals and other organs, pale green, set with spreading bristly hairs. Petals 4, large, thin, satiny, brilliant red, with a dark purple spot at the base, crumpled in the bud; the two outer much wider than long, falling over; the two inner about as broad as long, concave, erect; all early caducous. Stamens numerous, hypogynous; filaments narrow, blackish purple; anthers small, violet. Ovary globular-topshaped, 1-celled, with 10 or more placentæ projecting from the wall nearly to the centre; stigmas about 10—14, sessile on and radiating from the centre of the conical summit of the ovary. Capsule shortly stalked, barely $\frac{1}{2}$ inch long and about $\frac{3}{8}$ inch wide, half-ovoid, truncate, perfectly smooth, faintly ribbed along

* *Rhœas*, in Greek ῥοίας, the classical name of the plant.

the lines of the dissepiments, pale brown, the flat top projecting eave-like beyond the edge and crenate at the margin, dehiscing by a separation of part of the wall from the top, which remains supported by the dissepiments, between each two of which a square orifice is left. Seeds very numerous, minute, lightly attached all over the parietal placentas, reniform, coat marked with elegant raised reticulations; embryo at base of abundant endosperm.

The form of the leaves is subject to great variation, and there is a form with the hairs of the flower-stalks adpressed instead of spreading. Five or six petals instead of four are not uncommon, and the flower is sometimes white.

Habitat.—Few plants are more familiar than the poppy, which is a common weed in all parts of England, especially in cornfields, but also in waste places, railway banks and recently disturbed ground, being at times exceedingly abundant on light soils. In Scotland it does not reach farther north than Forfar. It is common throughout Europe, except in Scandinavia and North Russia, and extends through Asia Minor to North-West India. Its original home is considered by De Candolle to be Dalmatia, Sicily, the Island of Zante, and the South-East Caucasus.

DC. Syst., ii, p. 76; Syme, E. B., i, p. 87; Hook. f., Stud. Fl., p. 15; Watson, Comp. Cyb. Brit., p. 89; Boiss., Fl. Or., i, p. 113; Hook. f., Fl. Ind., i, p. 117; Lindl., Fl. Med., p. 15.

Official Part and Name.—RHŒADOS PETALA. The fresh petals (B. P.). The petals (*Rhœados Petala*) (I. P.). Not official in the United States Pharmacopœia.

General Characters and Composition.—When fresh, red poppy petals are nearly flat, have a bright scarlet colour, a strong narcotic odour, and a slightly bitter taste; but when dried even with the greatest care, they crumple up, lose their odour, and assume a brownish violet-red colour. The fresh petals are to be preferred for use, and are alone official. The principal constituent of red poppy petals is the colouring matter, of which they contain

about 40 per cent. At present this colouring matter has been but imperfectly examined. Acids diminish its intensity, while alkalies render it nearly black. By this latter character the colouring matter of red poppy petals may be distinguished from that of red cabbage, &c., which becomes green under the same circumstances. According to Leomeier the colouring principles of the petals are two acids, which he has termed *rhœadic* and *papaveric*.

According to Chevalier, the petals contain a trace of morphia, but no other chemist has succeeded in obtaining this substance from them. Attfield especially, who examined them recently, could not find the slightest indication of morphia. The milky juice of the capsules and herb generally, however, yielded Hesse a colourless crystallisable substance, with a weak alkaline reaction, which he termed *rhœadine*. The same substance may be found in the ripe capsules of the opium poppy and even in opium itself.

Medical Properties and Uses.—Red poppy petals have been supposed to have, especially when fresh, very slight narcotic properties, but they are now only employed for their beautiful colour, which they readily communicate to water.

The milky juice of the capsules and herb has, however, a manifestly sedative action, which is probably due to *rhœadine*.

Per. Mat. Med., by B. & R., p. 939; Pharmacographia, p. 37; U. S. Disp., by W. & B., p. 739; Ph. Jl., vol. iv, 3 ser., p. 290; Journ. de Pharm., ii, 513.

DESCRIPTION OF PLATE.

Drawn from a specimen collected at Leatherhead, Surrey.

1. Transverse section of ovary.
2. Capsule (drawn somewhat too long).
3. Seed.
4. Section of the same.

(3 and 4 greatly magnified.)

D.Blair adnat. del et lith.

M&N.Hanhart imp.

SANGUINARIA CANADENSIS, *L.*

N. Ord. PAPAVERACEÆ.

Tribe *Papavereæ*.

Genus Sanguinaria, *Linn.** B. & H. Gen., i, p. 53; Baill., Hist. Pl., iii, p. 112. The only species.

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20. Sanguinaria canadensis, *Linn., Sp. Plant., ed.* i, *p.* 505 (1753).

Blood-root. Red-root. Puccoon. Indian Paint.

Figures.—Barton, t. 2; Bigelow, t. 7; Nees, t. 407; Bot. Mag., t. 162; A. Gray, Ill. Gen., t. 49; Baill., l. c., f. 128-9.

Description.—An herbaceous perennial with a horizontal subterranean root-stock, giving off fibrous roots below, and terminating in a bud, which expands into an erect scape surrounded by one, or more rarely two, leaves, with several sheathing scales externally. Rhizome about the size of a finger, cylindrical, fleshy, coppery-red externally, brilliant red when cut, and filled with a copious orange-red juice. Leaves on long, thick, orange-coloured petioles, at first wrapped round the flower bud, and not growing to their full size till after the flower has fallen; then reniform, 5 inches wide, on petioles more than a foot long, palmately 5—9 veined, and deeply cut into 5—9 rounded, cut, and lobed segments, glabrous, pale green above, bluish-white beneath, veins orange. Flower-stalk slender, upright, tapering, 4—6 inches high, longer than the young leaf, cylindrical, terminated by a single large erect flower. Sepals 2, ovate, very fugacious. Petals varying in number from 7—14, usually 8, oval or oblong, variable in width, blunt, about an inch long, spreading, quickly falling, white or faintly tinged with rose, imbricate in two or three rows. Stamens about 24, hypogynous, in several rows, much shorter than the petals; anthers narrow, dehiscing longitudinally. Ovary linear-oblong, 1-celled; placentas 2, parietal; ovules numerous, anatropous, horizontal; style short; stigma 2-lobed.

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* Named from the blood-red juice of the root.

Capsule soft, oblong, pointed at both ends and tipped by the style, 1-celled, 2-valved. Seeds numerous, roundish, smooth, with a prominent crest along the raphe; embryo minute in the base of the fleshy endosperm.

Habitat.—The plant is confined to North America, where it has a wide distribution throughout Canada and the United States, growing on hill-sides and at the borders of woods on a rich soil, and flowering in the early spring before the leaves have expanded. It does well in English gardens, and has been cultivated since before 1680. Dillenius, in his 'Hortus Elthamensis' (t. 252), has figured it with double flowers.

DC. Syst., i, p. 89, and Prod., i, p. 121; Hook., Fl. Bor. Am., i, p. 34; A. Gray, Man. Bot. U. S., p. 60; Chapman, Fl. South States, p. 22; Lindl., Fl. Med., p. 16.

Official Part and Name.—SANGUINARIA. The rhizome (U. S. P.). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—This substance is commonly called *Blood-root* from its red colour. As seen in commerce in a dried state, sanguinaria is in pieces from one to two or three inches in length, and from a quarter to half an inch or more in thickness; it is flattened, wrinkled, twisted, more or less contracted, frequently presenting abrupt branches or offsets, and sometimes with, and at other times without, slender red rootlets. Its colour is dark reddish-brown externally, and it breaks with a short somewhat uneven waxy fracture, the surface of which at first presents a bright orange-red colour, but by exposure it becomes ultimately dull brown. The colour of the powder is greyish orange-red. Sanguinaria has a faint narcotic odour, which is more perceptible when fresh, and a bitter, persistently acrid taste.

Sanguinaria is supposed to owe its acrimony and medical properties to a peculiar alkaloid termed *sanguinarina,* which was first isolated by Dr. Dana, of New York. This is said to be identical with *chelerythrin,* the alkaloid of Celandine (*Chelidonium*

majus). Its salts are all soluble in water and form beautiful red solutions. Three other principles have been noticed as constituents of sanguinaria, one of which is regarded by Riegel, its discoverer, as analogous to the *porphyroxin* of opium, but this is denied by Gibb ; the second has been termed *puccin ;* and the third *sanguinarinic acid.* Sanguinaria is said to deteriorate rapidly by keeping.

Medical Properties and Uses. — Sanguinaria is emetic and purgative in large doses ; and stimulant, diaphoretic, and expectorant in small doses. It is also said to act as an emmenagogue ; and Eberle states that it exercises a sedative influence on the heart as certain as that of digitalis. In excessive quantities it acts as an acro-narcotic poison. When applied externally it is reputed to have well-marked escharotic properties, and Dr. Fell, of the United States, strongly recommends a mixture of it and chloride of zinc made into a paste with flour and water, as an external application for the destruction of cancerous growths ; but from trials made with it at the Middlesex Hospital and elsewhere in this country it would appear that, if it produces any effect in such cases it must be very small indeed, and that it is, therefore, practically useless for such a purpose. Sanguinaria might probably be useful as a dyeing agent.

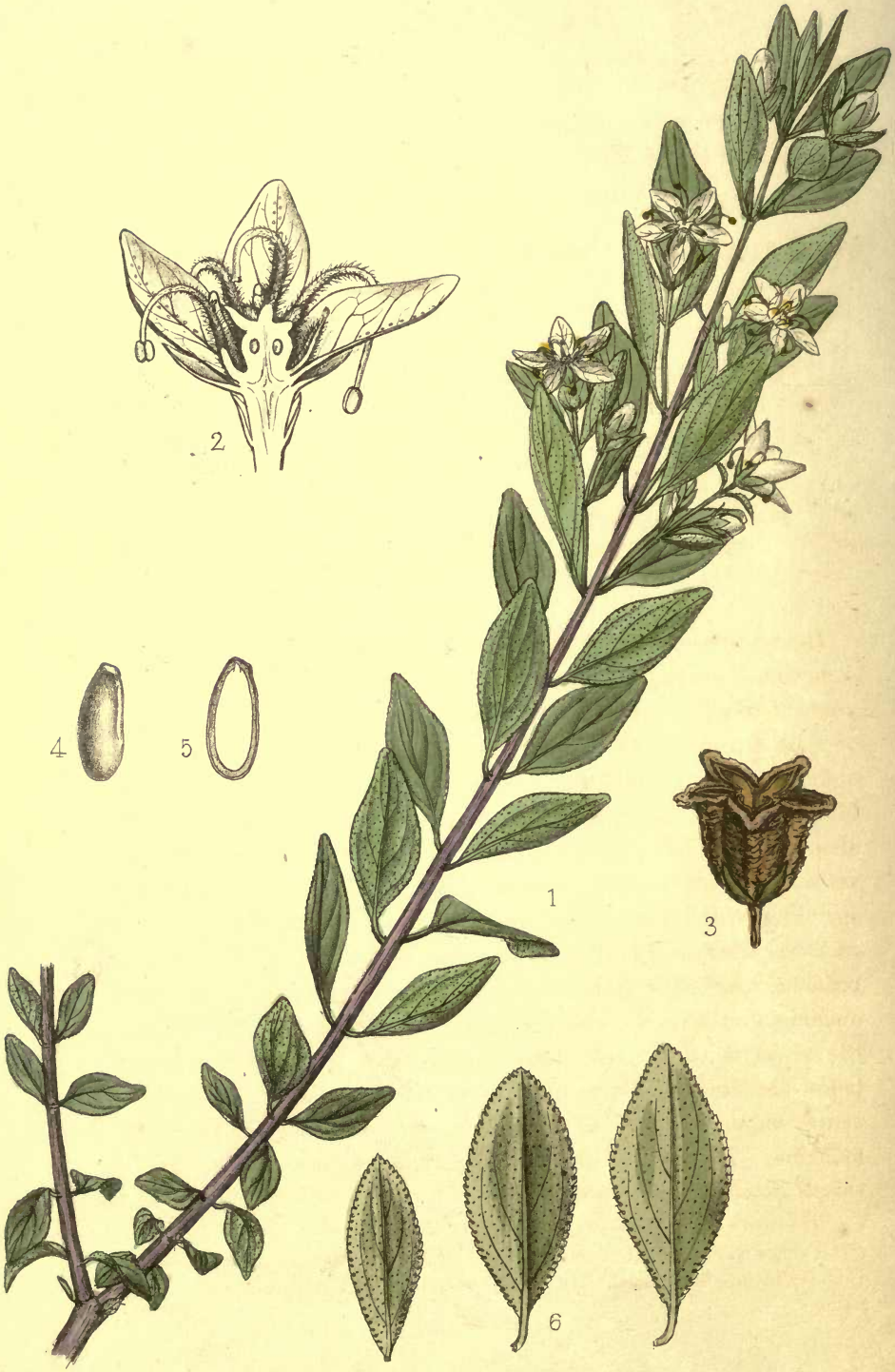
U. S. Disp., by W. & B., p. 769; Ph. Jl., vol. xvii, p. 312, vol. i, 2nd ser., p. 454, and vol. iv, 2nd ser., p. 263; Per. Mat. Med., vol. ii, part 2, p. 660.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in the Royal Gardens, Kew, flowering in April; the fruit and seed added from A. Gray.

1. A bud, showing the sepals.
2. Vertical section of ovary showing insertion of stamens.
3. Transverse section of ovary.
4. Fruit.
5. Seed.
6. Transverse section of the same.

(2, 3 enlarged; 5, 6 much magnified.)



D.Blair ad nat. del. et lith.

M&N Hanhart imp.

BAROSMA CRENULATA, *Hook*

N. Ord. RUTACEÆ.

Tribe *Diosmeæ*.

Genus **Barosma**, *Willd.*

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46. Barosma crenulata, *Hook., Bot. Mag.*, 3413 (1835).*

Bucchu. Buchu. Bucco. Buku.

Syn.—Diosma crenulata, *Linn., Amœn. Acad.* D. crenata, *Linn., Sp. Plant.* D. odorata, *DC.* D. latifolia, *Lodd.* Barosma odoratum, *Willd.* (name only). B. crenata, *Kunze.* B. Eckloniana, *Berg.* Baryosma odorata & Bucco crenata, *Roem. & Sch.* Parapetalifera odorata, *Bartl. & Wendl.*

Figures.—Nees, t. 377; Bot. Mag., t. 3413; Loddiges' Bot. Cabinet, t. 290; Berg & Sch., t. 1 e; Berg in Bot. Zeitung, 1853, t. xii, figs. A—Q.

Description.—A small bush 3 or 4 feet high, with stiff, slender, somewhat angular branches; bark smooth, reddish-purple; young twigs covered with immersed oil-glands. Leaves opposite or sub-alternate, shortly stalked or rarely sub-sessile, oval, oblong, or rhomboidal-oval, rather thick, glabrous on both sides, bluntish at the apex, narrowed at the base, ¾—1½ inch (usually about an inch) long, with a marked midrib and a few curved lateral veins, finely serrate or crenate-serrate, under surface paler and sprinkled with immersed oil-glands, one of which also stands in each serrature. Flowers solitary, at the ends of short lateral branches and in the axils of their small leaves, the terminal flowers opening first, true pedicels thickened upwards, a little longer than the calyx, with two or three ovate, ciliated, transparent bracts below the flower. Calyx deeply cut into 5 lanceolate-triangular, acute segments, each with a thick midrib and finely ciliated margins. Petals 5, imbricated, two or three times as long as the calyx, ovate, blunt, spreading, glandular-punctate on the back,

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* From an error in the synonymy in the Bot. Mag., it is made to appear that Willdenow is the authority for *B. crenulata*. He has no species with that name.

white, purplish in bud. Stamens 5, hypogynous, alternating with the petals, and ultimately recurved between them over the side of the flower; filaments as long as or longer than the petals, hairy for $\frac{2}{3}$ of their length upwards; anthers 2-celled, innate, roundish; between the stamens and opposite the petals are 5 erect, linear-oblong, blunt, gland-tipped staminodes not half the length of the stamens, slightly hairy. Ovary large, of 5 rounded lobes, each crowned by a spreading, fleshy, pubescent appendage, surrounded at the base by a narrow, prominent, entire disk, 5-celled, with 2—4 ovules in each cell attached to the upper end of the axis; style simple, hairy below, about as long as the stamens; stigma simple, blunt. Fruit of 5 cocci, adherent by their inner margins, about $\frac{3}{8}$ inch long by $\frac{1}{2}$ inch wide, gland-dotted, rugged and warty externally, each coccus terminating at the outer angle above in a projecting ear, and containing a single seed; dehiscence along the summit and ventral suture of each carpel; the inner wall of the pericarp also splitting away from the rest and down its dorsal suture, and forming a hard, smooth, shining, pale yellow, two-lobed envelope to the seed. Seed oblong, rounded at each end, smooth, shining, black, with the hilum white, embryo without endosperm, with large cotyledons and a small superior radicle.

There is a considerable range in the form of the leaves of this species, and, as shown by the synonymy, it has been divided into several. Berg, who has very carefully studied the Buku plants, considers *B. crenata*, Kunze, as distinct, and figures a twig in Berg and Sch., l. c., fig. A 2, and the leaves in his elaborate paper in the Bot. Zeit. quoted below, figs. J—N. He also makes a new species, *B. Eckloniana*, Berg, characterised by the leaves rounded below and the young twigs pubescent, of which a branch and enlarged drawings of the leaves are given in the same paper, figs. O—Q. The present species, *B. crenulata*, Hook., he divides into three varieties, of which the plate in Berg and Sch. represents var. *latifolia*, and figs. A—H in the Bot. Zeitung, vars. *longifolia* and *angustifolia*.

Habitat.—The true Buku bush grows abundantly in stony,

hilly valleys in the western parts of Cape Colony, S. Africa, including the neighbourhood of Cape Town itself and the mountains of Stellenbosch and Worcester. It is a pretty plant, the flowers appearing in spring and lasting a long while. Introduced into England by Masson nearly a century ago, it was cultivated as an ornamental plant for many years, but does not appear to have perfected seed here. Being also difficult to propagate by cuttings, it has now died out in most if not in all of our botanic gardens.

Harv. & Sonder, Fl. Cap., i, p. 393; Berg in Bot. Zeit., 1853, 910; Lindl., Fl. Med., p. 212; Pappe, Fl. Cap. Med. Prodr., ed. 3, p. 7.

Official Part and Name.—Buchu Folia. The dried leaves of Barosma betulina, *Bart.*; Barosma crenulata, *Hook.*; and Barosma serratifolia, *Willd.* (B. P.). The dried leaves (*Barosmæ vel Buchu Folia*) of the above species of Barosma (I. P.). Buchu. The leaves of Barosma crenata, and of other species of Barosma (U. S. P.).

General Characters and Composition.—Buchu leaves are imported from the Cape of Good Hope. Commercial Buchu consists of the leaves of one of the above-mentioned species of *Barosma*, frequently more or less mixed with the flowers, fruits, and stalks of the same plants. The leaves of all the species are smooth, coriaceous, more or less serrate or crenate at their margins, and marked on the edges, and especially on their under surface, with glands filled with essential oil. They have a dull yellowish-green colour, somewhat paler on their under surface; their odour is strong, penetrating, and peculiar, and their taste aromatic, somewhat bitterish, and mint-like.

The leaves of *Barosma crenulata*, the species now under notice, vary in shape and size in different samples, and have been already fully described; from their shape this kind of Buchu is sometimes distinguished as *ovate-oblong Buchu.*

Buchu leaves owe their properties, in a great degree at least, to a powerfully scented *volatile oil*, which, on exposure to cold,

furnishes a kind of camphor termed *barosma camphor*. They also contain abundance of mucilage, which originates as in quince seeds and linseed by solution of the cell-walls. A substance called *Diosmin* or *Barosmin* has also been described by Landerer, but it requires further investigation.

Medical Properties and Uses.—Buchu leaves act as a slight tonic and aromatic stimulant, and are also regarded as diuretic and diaphoretic. Buchu appears also to have a specific influence on the genito-urinary organs. It is given principally in chronic catarrh of the bladder, irritable conditions of the urethra, prostatic affections, gravel, &c. It has also been recommended in chronic rheumatism, dyspepsia, dropsy, and certain cutaneous affections. It is commonly given in combination with alkalies, as solution of potash. The Hottentots esteem buchu highly on account of its odour, rubbing the powdered leaves upon their greasy bodies.

Per. Mat. Med., vol. ii, part ii, p. 400; U. S. Disp., by W. & B., p. 182; Pharmacographia, p. 99; Per. Mat. Med., by B. & R., p. 888; Flückiger, in Schweiz. Wochenschrift für Pharm., Dec., 1873.

DESCRIPTION OF PLATE.

Drawn from Cape specimens collected by Niven, in the British Museum. The seed added from Berg and Schmidt.

1. A flowering branch.
2. Vertical section of a flower.
3. Ripe fruit.
4. Seed.
5. Section of the same.
6. Leaves.

(2—6 enlarged.)

D.Blair. ad. nat. del. et lith.

M&N Hanhart. imp.

CITRUS AURANTIUM, *Risso.*

N. Ord. RUTACEÆ.
Tribe *Aurantieæ*.
Genus Citrus, *Linn.*

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51. Citrus Aurantium,* *Risso, in Ann. du Museum*, xx, *p.* 181, (1813).

Orange. Sweet Orange. China Orange. Portugal Orange.

Syn.—C. Aurantium, *Linn.* (in part).

Figures.—Woodville, t. 188; Hayne, xi, t. 28; Nees, t. 425; Risso, Hist. Orang., tt. 3—39.

Description.—A small tree, rarely reaching 20 feet in height, with an upright trunk much branched above, the branches spreading into a regularly shaped, more or less spherical head; bark smooth, greyish-brown on the older branches, dull whitish-green on the younger ones. Leaves evergreen, alternate, often with short, solitary, sharp spines in the axils; blade oval or ovate-oblong, acute, 3 or 4 inches long, smooth, shining, dark green, paler below, entire or faintly serrate, articulated on the petiole, which is ½—1 inch long and more or less broadly winged. Peduncles solitary, axillary, usually 1-flowered, sometimes 2- to 6-flowered, smooth, generally shorter than the petiole. Calyx cup-shaped, with 5 short, broad, acute teeth, thick, pale green, persistent. Petals 5, oblong, 1—1¼ inch long, thick and fleshy, blunt, brilliant white, with yellowish sunken glands on the back, strongly recurved. Stamens 20—25, hypogynous, filaments unequal, flattened, often united at the base in threes or fours, shorter than the petals; anthers oblong-linear, versatile, bright yellow. Ovary cylindrical, striated longitudinally, with numerous oil-glands below the epidermis, surrounded at the base by a swollen, prominent, rounded disk, 8- or more celled, with several anatropous ovules in each cell attached in two rows to the axile

* The mediæval name for the fruit; also written *arantium*, and, like the English word *Orange*, from the Sanskrit *Nagaranga*, through the Arab *Naranj*.

placentæ; style thick, nearly as long as the stamens; stigma rounded, channeled. Ripe fruit, a large round berry somewhat compressed at its two ends, usually 9—11-celled, the loculi packed with a soft tissue of large irregular, fusiform, horizontal, loosely connected cells or vesicles, filled with a sweet juice, the dissepiments very thin, membranous, the axis spongy; pericarp thin, spongy, externally smooth, slightly irregular from the projection of the numerous crowded oil-cysts below the epidermis, rich orange yellow. Seeds several in each cell, horizontal, loose in the pulp, about $\frac{3}{4}$ inch long, oblong-ovoid, somewhat compressed, usually with a blunt point at the apex above the chalaza, and somewhat truncate at the hilum; testa soft, pale yellow, veiny; embryo of two large, unequal, irregular, thick, plano-convex cotyledons and a small, superior radicle; endosperm none; not very unfrequently two embryos are produced in a single seed.

Habitat.—The sweet orange can scarcely be said to be known in a wild state, but all circumstances appear to concur in pointing to Northern India, or possibly to Southern China as its original home. It was unknown to the Greek and Roman writers, and, indeed, was not introduced into Europe till about the middle of the 15th century by the Portuguese. It is now sparingly cultivated in India, but very abundantly in many parts of the Mediterranean district, and in Spain, Portugal, Madeira, the Azores, and China. Numerous varieties are distinguished by cultivators, no less than 44 being described, and most of them beautifully figured in Risso's sumptuous 'Histoire des Orangers,' the differences residing almost entirely in the form, colour, &c., of the fruit. In the South of Europe the trees are in full flower in April and May, and the fruit, which takes a year or more to ripen, is in perfection at much the same time. The tree is familiar enough in our greenhouses, where it fruits pretty freely, but English-grown oranges want the sweetness of those of southern climes.

Hook. f., Fl. India, i, p. 515; Brandis, Forest Fl., p. 53; Lowe, Fl. Madeira, i, p. 73; Lindl., Fl. Med., p. 163.

Official Parts and Names.—The FLOWERS only are official in the British Pharmacopœia as follows:—AQUA AURANTII FLORIS. The distilled water of the flowers of the Bitter Orange tree, Citrus Bigaradia, *Risso;* and of the Sweet Orange tree, Citrus Aurantium, *Risso.* In the Pharmacopœia of India, under the head of CITRUS AURANTIUM, *Linn.*, which is called the Sweet and Bitter Orange tree, both the dried outer portion of the rind of the fruit (*Aurantii Cortex*) and Flowers are mentioned, but the flowers of the Sweet Orange are alone directed to be used in the preparations of that volume. 1. AURANTII FLORES. The flowers of Citrus Aurantium and of Citrus vulgaris; 2. AURANTII DULCIS CORTEX. The rind of the fruit of Citrus Aurantium (U. S. P.).

1. AURANTII FLORES. *Orange Flowers.*—Orange flowers are white when fresh, but become yellowish on being dried. They have a fragrant odour which is most powerful in the fresh flowers.

Production of Orange Flower Water.—By distilling the fresh flowers with water in the ordinary way, *Orange Flower Water* passes over, together with a volatile oil called *Oil of Neroli,* which floats on the surface. When the oil is removed we have the *Aqua Naphæ* or *Orange Flower Water* of commerce. This is commonly prepared in the South of France at Grasse, Cannes, and Nice; it is, however, generally distilled from the flowers of the bitter orange, which are regarded as yielding the most fragrant product.

General Characters and Composition of Orange Flower Water.—Orange flower water is nearly colourless, or with a slight greenish-yellow tint. It has a very fragrant odour and a bitter taste. From being distilled or kept in copper or lead vessels it sometimes contains metallic impurity; hence the test of the British Pharmacopœia:—"Not coloured by sulphuretted hydrogen." Orange flower water also frequently contains some of the distilled water of orange leaves, for these, like orange flowers, yield by distillation a water and a volatile oil called *Essence de Petit Grain.* The perfume of these are, however, far less sweet than the similar products of the flowers.

as the Noble or Mandarin Orange, and the Tangerine Orange. So prolific is the orange tree that one plant will sometimes produce as many as 20,000 oranges.

Per. Mat. Med., vol. ii, p. 544; Pharmacographia, pp. 113 and 115; U. S. Disp., by W. & B., pp. 157 and 1039; Per. Mat. Med., by B. & R., p. 913.

DESCRIPTION OF PLATE.

Drawn from a specimen grown at Kew.

1. A branch with flowers and fruit.
2. Pistil with the petals and half the stamens removed.
3. Vertical section of ovary.
4. A petal.
5. Transverse section of fruit.
6. A seed.
7. Section of same showing the raphe.

(2 and 3 enlarged.)

D. Blair ad sicc. del. et lith.

M. & N. Hanhart imp.

OLEA EUROPÆA. L.

N. Ord. OLEACEÆ.

Genus **Olea**, *Linn.** DC. Prod., viii, pp. 283—288. About 35 species are known, found in the warmer parts of both hemispheres, but chiefly in the old world.

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172. Olea europæa, *Linn., Sp. Plant., ed.* 1, *p.* 8 (1753).

Olive.

Syn.—O. Oleaster, *Hoffm. & Link.* O. lancifolia, *Moench.* O. gallica, *Mill.*

Figures.—Woodville, t. 98; Steph. & Ch., i, t. 15; Nees, t. 212; Hayne, x, t. 10; Berg & Sch., t. 33 b; Fl. Græca, t. 3; Nees, Gen. Fl. Germ., Gamop.

Description.—Usually a small, much-branched, evergreen tree, from 10—30 feet high, having somewhat the appearance of a white willow, but under favorable circumstances becoming much larger; branches numerous, slender, with opposite branchlets; bark greyish-white, nearly smooth. Leaves opposite, very shortly stalked, lanceolate or obovate-lanceolate, about 2—2½ inches long, rather variable in width, acute, tapering to the base, quite entire, the margin slightly recurved, texture coriaceous, smooth on both surfaces, the upper pale glaucous green, the lower silvery white, completely covered with a dense layer of minute, flat, stellate scales, which conceal the lateral veins. Flowers numerous, small, in simple or branched racemes in the axils of the older leaves, and shorter than them; inflorescence beset with stellate scales. Calyx deeply cup-shaped, small, pale green, smooth, with 4 shallow teeth. Corolla deeply cut into 4 (very rarely 5) oval, acute segments, much larger than the calyx, creamy white. Stamens 2, inserted on the tube of the corolla, and alternating with the segments; anthers very large, much longer than the short thick filament, anther-cells innate, curved, bursting outwards. Ovary superior, small, fleshy, 2-celled, about the length

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* The classical name; in Greek ἐλαία.

of the calyx, with 2 pendulous ovules in each cell; style short, stigma bifid. Fruit a drupe, from ½—1 inch in length, ovoid, usually pointed at apex, deep purple or nearly black; sarcocarp firm, fleshy, filled with oil; stone (putamen) thick, bony, narrowly ovoid, with a blunt keel down one side, acuminate, containing a single seed. Testa thin, membranous, veiny; raphe very distinct, running up one side within the putamen, and perforating its base; embryo straight, in axis of endosperm, cotyledons foliaceous, radicle superior.

Habitat.—The native country of the olive has been pretty certainly determined to be Asia Minor and Syria, but it has been a cultivated plant in parts of the Mediterranean region from very early times. At the present day very extensive districts are devoted to olive culture in Portugal, Spain, Italy, the South of France, and Algeria, and the tree is frequently found apparently wild in these and other countries. The olive orchards, covering many square miles of country, give a distinct character to large tracts of Spain and Italy. The trees are usually pollarded, and have none of the beauty of those left to grow naturally. The olive was long ago introduced into Peru and Chili. In England it flowers freely enough, and under favorable circumstances will even produce fruit, as in the late D. Hanbury's garden at Clapham Common, near London. It is hardier than the lemon.

As with other cultivated fruits there are several varieties of the olive; the largest are produced in Spain; in the wild state the fruit is very bitter. The tree flowers in spring and early summer, and the fruit is fully ripe in November.

DC. Prod., viii, p. 284; Bertoloni, Fl. Ital., i, p. 45; Gren. & Godr., Fl. France, ii, p. 474; Lindl., Fl. Med., p. 547.

Official Part and Name.—Oleum Olivæ. The oil expressed in the south of Europe from the ripe fruit (B. P.). The oil expressed from the fruit (*Olivæ Oleum, Olive Oil*) (I. P.). Oleum Olivæ. The fixed oil obtained from the fruit (U. S. P.).

Production, Commerce, and Varieties.—The ripe fruits which are

commonly known as *Olives*, are remarkable for the large quantity of fixed oil contained in their pulpy portion or *sarcocarp*. Thus, this portion when the olives are quite ripe yields about 70 per cent. of oil, and 25 per cent. of water.

The mode of extracting olive oil is somewhat modified in different countries, but consists essentially in submitting the crushed ripe fruit to moderate pressure. In France the finest oil is procured by crushing the fruit in the mill immediately after it is gathered, and then submitting the paste thus obtained, which is placed in coarse bags, to moderate pressure in a screw-press. The oil thus expressed is conveyed through tubs or other receptacles containing water, from the surface of which it is subsequently skimmed. This first product has a greenish tint, and is called *Virgin Oil*. After the oil has ceased to flow, the cake or marc is removed from the bags, broken up with the hand, moistened with boiling water, and submitted to increased pressure. The products are water, and oil of a second quality, which separates by standing. With the view of increasing the yield of oil, the olives are sometimes allowed to undergo incipient fermentation by being placed in heaps for a long time before they are pressed. The quality of the oil is, however, by this mode of procedure, much deteriorated; it is termed by the French *Huile fermentée*. A still inferior quality of oil is obtained by submitting the residues to pressure.

Various kinds of olive oil are known in commerce, as Provence oil, Florence, Gallipoli, Spanish, Sicily, &c. The Provence oil is the most esteemed. Italy produces annually about thirty-three million gallons of olive oil, representing a value of £8,000,000 sterling. The annual production of France has been estimated at about five and a half million gallons. The value of the oil imported into this country in 1872 was about £1,200,000. From Italy we received about one half of the whole quantity, from Spain about one fifth, and the remainder from other countries bordering on the Mediterranean.

General Characters and Composition.—Olive oil, which is also called *salad oil* and *sweet oil*, is an unctuous liquid of a pale

yellow or greenish-yellow colour, with a very faint agreeable odour, and when fresh having a bland oleaginous taste, but by long keeping it becomes slightly acrid. Its specific gravity varies somewhat, averaging at 63° Fahr. 0·916°. Olive oil is but very slightly soluble in alcohol, but it is soluble in about twice its volume of ether. The finer kinds of oil do not readily become rancid by exposure to the air, but the second qualities soon become so. At about 36° Fahr. olive oil begins to congeal, and at about 21° it separates into two portions, one solid, consisting of about 28 per cent. of the whole, which is commonly termed *margarine;* and the other fluid, forming about 72 per cent., and called *oleine.* The finer qualities of oil contain most oleine. Oleine by saponification yields *oleic acid* and a sweet principle termed *glycerine; margarine* also yields by saponification *glycerine* and *margaric acid,* which latter is sometimes regarded as a mixture of stearic and palmitic acids. Olive oil is not a drying oil, and therefore does not readily increase in consistence by exposure to the air.

Medical Properties and Uses.—Olive oil is demulcent, and in large doses mildly laxative. It is a frequent constituent of laxative enemas, especially when they are used in affections of the bowels. It is also employed as an antidote in cases of poisoning; it acts by enveloping the poison, sheathing the living surface, and thus mechanically obstructing absorption. Externally applied it is sometimes useful in preventing, or at least relieving, the ill effects produced by the sting of a wasp or bee. Thus, Dr. F. J. Farre says that "the obstruction which it causes to the absorption of poison is often very serviceable, and is sometimes sufficient to prevent any bad effects from following. I have often applied oil to the recent sting of a wasp or bee even after the pain had extended from the wounded finger to the entire arm, and have always found the pain cease after a few minutes. It has sometimes returned for a day or two immediately after washing the hands until oil was again applied to the wound." Olive oil is chiefly used externally, however, as an emollient vehicle for liniments and other external applications. It has also been applied externally in skin diseases to relieve pruritus; and in burns and scalds to

protect the surface from the action of the air. Smeared over the skin it has been sometimes thought to be a preventive of the plague.

Olive oil is also largely used in pharmacy in the preparation of the official Hard and Soft Soaps, and as one source of Glycerine.

As olive oil is not a drying oil, and not readily becoming rancid, it is very useful for greasing delicate machinery, more especially watches and clocks. For this purpose, however, the fluid portion or oleine is alone used. "To prepare it for the latter purpose the oil is cooled and the more liquid portion poured off, a piece of sheetlead is then immersed in this, and it is exposed in a corked bottle to the action of sunshine. A white matter gradually separates, after which the oil becomes clear and colourless, and is fit for use." (*Brande.*) Or, it may be obtained by pressing the solid portion of frozen oil between layers of bibulous paper, and then squeezing the paper under water, when the oleine collects upon the surface.

In the olive countries of Europe the oil is consumed to an enormous extent as a food substance, but in this country and in the United States its dietetical uses are very limited.

Other Products of the Olive Tree.—In warm countries a resin-like substance exudes spontaneously from olive trees. This was formerly described by Dioscorides as the tears of the Æthiopic olive; and in modern times it has been called *olive gum* or *Lecca gum.* Formerly it was thought to possess useful medicinal properties, but it is not now employed.

The leaves and the young bark have been employed externally as astringents and antiseptics, and internally as tonics in intermittents. According to Mr. Maltass, of Smyrna, a decoction of olive leaves made by boiling two handfuls in a quart of water until reduced to half a pint, has been very successfully used in the Levant in the treatment of obstinate cases of fevers. Others have also testified to the febrifuge properties of the leaves as well as to that of the bark.

Olive wood is beautifully veined, and has an agreeable odour; it is much esteemed by cabinet makers for these reasons, and on account of the fine polish of which it is susceptible.

The fruit of the olive is, however, by far the most useful product of the plant, for independently of its great value when ripe as the source of olive oil already fully described, it is much esteemed in its unripe condition as a dessert. For this purpose the green unripe fruits are first deprived of some of their bitterness by repeatedly steeping them in water, to which lime and wood ashes are sometimes added to shorten the process, and then preserved by bottling them in a slightly aromatised solution of salt. Several varieties of preserved olives are met with, but the most common are the small French or Provence olives, and the large Spanish olives. The kind called *Olives à la Picholine* are prepared by steeping olives in a solution of lime and wood ashes.

Per. Mat. Med., vol. ii, pt. i, p. 665; Pharmacographia, p. 375; Per. Mat. Med., by B. & R., p. 661; U. S. Disp., by W. & B., p. 606; Steph. & Church., Med. Bot., by Burnett, pl. 15, vol. i; Jl. Soc. Arts, May 22, 1868; Ph. Jl., Feb., 1854, p. 353.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected at Montpellier.

1. Branch in flower.
2. Section of flower.
3. Corolla laid open, with stamens.
4. Transverse section of ovary.
5. Ripe fruit.
6. Same with half the sarcocarp removed to show the stone.
7. Stone half cut away, showing the seed.
8. Section of seed.
9. Embryo.

(2, 3, 4 enlarged.)

D. Blair ad nat. del. et lith.

M&N.Hanhart imp.

JUNIPERUS COMMUNIS, *Linn.*

N. Ord. Coniferæ.
Tribe *Cupresseæ*.
Genus Juniperus, *Linn.*

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255. Juniperus communis, *Linn., Sp. Pl., ed.* 1, *p.* 1040 (1753).

Juniper.

Figures.—Woodville, t. 6; Bigelow, t. 44; Nees, t. 86; Steph. & Ch., t. 141; Berg & Sch., t. 8 e; Syme, E. B., viii, t. 1382 (bad); Nees, Gen. Fl. Germ., Apet.; Reich, Ic. Fl. Germ., xi, t. 535; Schnitzlein, Iconogr., t. 76.

Description.—A dwarf, procumbent, bushy evergreen shrub, or a neat bush 2—5 feet high with upright branches, or a small tree reaching 30 feet high; bark chocolate-brown, coming away in flakes on the old branches, young twigs divaricate. Leaves very numerous, persistent, arranged mostly in threes, spreading at right angles and rigid; when full-grown, about ½ inch long, linear, tapering to a sharp prickly point, articulated on stem, with a prominent knob at the base above, channeled, glaucous or pinkish, with green margins, above, bluntly keeled and bright green beneath; shorter and more concave at the base of the branches. Flowers dicœcious, the male in small catkins, the female in little cones; all axillary. Male catkins with a few small scales at base, ovoid or globose, about ⅛ inch long, consisting of several whorls of decussate horizontal stamens, each with three or four anther-cells attached to the base of the lower surface of the connective, dehiscing vertically. Female cones about ⅛ inch long, consisting of about 12—16 green, ovate, acute, fleshy scales, closely placed in 3 to 5 rows on a short axis and overlapping, the lower empty; the uppermost 3 surrounding the naked ovules, thinner, pinkish. Ovules erect, 3, alternating with the scales, in close contact and terminating the axis of the cone, flask-shaped, micropyles prolonged and projecting slightly beyond the uppermost scales. Fruit berry-

like (a galbulus) from the growth of the three uppermost bracts of the cone, which become greatly enlarged, fleshy, and completely coalescent except at their tips, and arching over the top enclose the seeds, at first green, and not ripening till the second year, when ripe purplish-black, soft, and covered with a whitish-blue "bloom," about the size of a pea, surrounded at the base with the empty scales of the cone. Seeds small, 3 in each fruit, close together, their upper half conical and triangular, the lower rounded; testa very hard, with several large glands or sacs on its lower part; embryo straight, in scanty endosperm, cotyledons 2, small; radicle superior.

Habitat.—The juniper, under one or other of its varieties (5 are described by Parlatore), has a very extensive distribution, extending throughout Europe and North Africa, Asia northwards from the Himalayas, Japan, and North America; the dwarf form reaches far into the arctic regions, occurring in Greenland and Kamtschatka. In England it grows in hilly places, and is a widely diffused though not very common species; in the south it especially prefers chalk downs, but also occurs on dry sandy heaths.

Some botanists consider the three uppermost scales of the cone as open carpels; it is worthy of remark that the ovules *alternate* with these and do not stand in their axils.

Parlatore, in DC. Prod., p. 479; Syme, E. B., viii, p. 273; Hook. f., Stud. Fl., p. 348; Wats., Comp. Cyb. Brit., p. 319; A. Gray, Man. Bot. U. S., p. 473; Hook., Fl. Bor. Am., ii, p. 165; Roxb., Fl. Ind., iii, p. 839; Brandis, For. Fl., p. 535; Lindl., Fl. Med., p. 556.

Official Part and Name.—Oleum Juniperi. The oil distilled in Britain from the unripe fruit (B. P.). The fruit (*Juniperi Fructus*) (I. P.). Juniperus. The fruit (U. S. P.).

1. The Fruit.—The fruit is commonly called a berry, although properly a *galbulus*. Juniper fruits are largely collected in Savoy, and also in the South of France, in Austria, and Italy. They are principally exported from Trieste and some Italian

ports. In this country, however, the oil, which is alone official, is directed to be distilled from the unripe fruit in Britain.

The juniper fruits of commerce are round, about the size of a pea or a black currant, of a deep purplish-black colour, and covered by a glaucous bloom. They are marked at the summit with three radiate furrows, and below with stellt ely arranged minute scales. Each fruit contains three bony seeds enveloped in a brownish-yellow pulp. The fruits have an agreeable aromatic odour when bruised; and a warm, somewhat spicy, sweetish, slightly terebinthinate taste.

Their properties are essentially due to a volatile oil (see *Oleum Juniperi*). They also contain a large quantity of *sugar*, some *resin*, and a very small proportion of an uncrystallisable substance named *juniperin*.

2. Oil of Juniper.—This is readily obtained by submitting the fruit to distillation with water. The volatile oil is most abundant in the full-grown green fruit, as in the course of ripening some of the oil becomes converted into resin. The amount of oil obtainable varies from 1 to 2 per cent. The oil is a colourless or pale greenish-yellow liquid, of a sweetish odour, and warm aromatic taste. It is limpid, transparent, levogyrate, and has a specific gravity varying from 0·839 to about 0·900. It is a mixture of two oils.

Juniper tops were formerly official, and possess similar properties to the fruit. Both the tops and juniper wood yield a volatile oil, which is frequently distilled abroad. It is sometimes substituted in this country and the United States of America for the official oil of juniper. It is sold at a much lower price than the true oil of juniper; and in its characters closely resembles oil of turpentine.

Medical Properties and Uses of Juniper Fruit and Oil.—Juniper fruit and oil possess carminative, stimulant, and diuretic properties; their action closely resembling terebinthinate substances. They communicate a violet odour to the urine of those taking them; and in large doses sometimes occasion irritation of the bladder and urinary passages. They have been found espe-

cially useful in different forms of dropsies, either administered alone, or in combination with other diuretics, more especially digitalis. They have been also employed in mucous discharges, as gonorrhœa, gleet, and leucorrhœa; and in some cutaneous diseases. Sir James Simpson considers oil of juniper an efficient diuretic when administered through the lungs, and he recommends for this purpose a teaspoonful of the oil to be put into a vessel of hot water, and the patient directed to inhale the vapours.

Formerly juniper fruits were "employed as a spice to food; and a spirit, of which wormwood was an ingredient, was obtained from them by fermentation and distillation. This spirit, called in French *Genièvre,* became known in English as *Geneva,* a name subsequently contracted into Gin." At the present time the gin distilled in Scotland is slightly flavoured with juniper berries, two pounds of berries being used to 100 gallons of gin; but the gin ordinarily distilled in England is flavoured with oil of turpentine.

The wood has been regarded as sudorific in its action, and according to Burnett, has been substituted for guaiacum and sassafras. We have never met with such a substitution, and except by accident, it is scarcely likely to occur.

Per. Mat. Med., vol. ii, pt. 1, p. 327; Per. Mat. Med., by B. & R., p. 483; Pharmacographia, p. 565; U. S. Disp., by W. & B., pp. 507 and 1308; Garr., Mat. Med., p. 368; Steph. & Church., Med. Bot., by Burnett, pl. 141, vol. iii.

DESCRIPTION OF PLATE.

Drawn from a plant collected at Mickleham, Surrey, in June, with the male flowers added from Berg and Schmidt. 1. A branch of a female bush, with flowers and fruit in various stages. 2. A female cone. 3. Vertical section of the same. 4, 5. Ripe fruit. 6. Vertical, and 7. Transverse section of same. 8. A seed. 9. Vertical section of same. 10. Male catkin. 11. Section of same. 12. A single stamen. (2, 3, 5—12 all enlarged.)

D. Blair ad nat. del. et lith.

M&N. Hanhart imp.

IRIS FLORENTINA, *Linn.*

N. Ord. IRIDACEÆ. Lindl., Veg. K., p. 159; Le Maout & Dec., p. 782.

Tribe *Irideæ*.

Genus Iris,* *Linn.* Klatt, in Linnæa, xxxiv (1865), p. 603. Species about 70, natives of temperate and subtropical regions in both hemispheres.

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273. Iris florentina, *Linn., Sp. Pl., ed.* 2, *p.* 55 (1762).

White Flag.

Figures.—Steph. & Ch., i, t. 27; Nees, t. 56; Hayne, xii, t. 1; Berg & Sch., t. 10 f; Bot. Mag., t. 671; Fl. Græca, t. 39; Redouté, Liliac., t. 23; Reich., Ic. Fl. Germ., ix, t. 339.

Description.—A perennial, with a thick, fleshy, nearly cylindrical, pale yellowish-brown rhizome, creeping at or just below the surface of the soil, and reaching a foot or more in length, sometimes branching; each year's growth marked by a contraction so that the rhizome has a jointed appearance, giving off thick fibrous roots below and marked by the scars of the leaf-attachments. Leaves several in each bud on the last year's growth of the rhizome, a foot or more long, an inch or more wide, clear, pale rather glaucous green, parallel-veined, sword-shaped, acute, equitantly sheathing below. Flowering-stem (scape) much exceeding the leaves, cylindrical, solid, faintly striate, stiff, with 2 or 3 branches, each from the axil of a sheathing semi-leafy bract. Flowers large, solitary, at the end of the stem and branches, each surrounded by two bracts (spathe), one longer than the other, green at their lower part, pale brown and scarious above. Perianth epigynous, tubular below, tube about an inch long, thick, pale green, divided above into 6 large white, obovate-spathulate, waved, and crumpled segments, the 3 outer somewhat narrower, elegantly recurved, bearing on the middle line of the upper surface at the base a band of densely set filaments, white with bright yellow tips, on either side of which are branched,

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* *Iris*, the rainbow Goddess, from the beauty and variety of colour in the flowers of the genus.

curved, brownish veins; the 3 inner curved outwards and then upwards and inwards, meeting to form a dome in the centre. Stamens 3, inserted on the tube of the perianth at the base of the outer segments, curved outwards; filaments tapering, somewhat longer than the extrorse anthers. Ovary inferior, nearly sessile, oblong, cylindrical, with 6 furrows, fleshy, 3-celled; style 3-fid; stigmas 3, large, obovate, similar in texture and colour to the petals, spreading outwards and curving closely over the stamens, transversely cleft at the extremity so as to form a chink between two lips, the lower (outer) of which is short and narrow, the upper (inner) divided into two erect triangular segments, slightly laciniate on their outer margins; placentation axile; ovules numerous. Fruit (not seen) capsular, 3-celled, loculicidally dehiscing, stated to be about an inch long, longly acuminate, faintly triangular. Seeds (not seen; of the genus, horizontal, compressed, smooth, with a lax testa and a small embryo with inferior radicle in the axis of fleshy albumen).

Habitat.—Though named *florentina,* it is the opinion of D. Hanbury, who had studied it and its allies in the neighbourhood of Florence, that it is only a naturalised plant in that district, being truly indigenous to the coast region of Macedonia and the south-west shore of the Black Sea; it is also found in several other parts of southern and eastern Europe, growing in dry, stony places, but it is doubtful if it occurs in the Iberian Peninsula, though it grows in the Riviera. As a cultivated plant it is a very old inhabitant of our gardens, but is less common and more tender than *I. germanica,* L. Along with that species and with *I. pallida,* Lam., it is grown in large quantity near Florence for its rhizomes. Most botanists maintain these as separate species, but the distinctions are very slight. The colour of the flower of *I. florentina* is usually somewhat slaty, or even faintly bluish, but often pure white; it flowers in May, a little after the common garden flag.

Bertoloni, Fl. Ital., i, p. 231; Grenier & Godr., Fl. France, iii, p. 241; Roem. & Sch., Syst. Veg., i, p. 457; Klatt, l. c., p. 603; Lindl., Fl. Med., p. 575.

Official Part and Name.—Iris Florentina. The rhizome (U. S. P. *Secondary*). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

Production and Commerce.—Orris rhizome, or orris root as it is commonly called, is derived indiscriminately in Tuscany, from three species of iris, namely, *I. florentina, I. germanica,* and *I. pallida,* the two latter species from being most abundant, probably furnishing the largest quantity. These species are known to the peasantry under the common name of *Giaggiolo.* The rhizomes are dug up in August, and are then trimmed, peeled, and dried in the sun, and are ultimately separated by the dealers who purchase them of the peasants into different qualities, *selected* and *sorts.* Orris rhizome is exported from Leghorn, Trieste, and Mogador.

General Characters and Composition.—Orris rhizome of commerce occurs in pieces of from 2 to 4 inches in length, and from about ½ to 1¼ inch in width. These pieces present an irregular, somewhat conical form, with usually two or three short branches at their broader end. They have a flattened appearance, and are more or less arched, and frequently twisted, somewhat shrivelled, and furrowed. On the lower surface they are marked with small roundish scars, which are left by the cutting off of the rootlets. They are firm and compact in texture, and of a dull whitish colour. Their taste is bitterish, faintly aromatic, and subsequently acrid; and they have an agreeable violet odour. This odour is not present in the fresh rhizomes, which have simply an earthy smell, but is gradually produced by drying and keeping, not being fully developed until the rhizomes are two years old.

The principal constituent of orris rhizome would appear to be a solid crystalline substance, called *orris camphor,* which is always found on the surface of the distillate when orris rhizome is distilled with water. According to Umney, the yield of this substance is about 0·12 per cent. The authors of *Pharmacographia* believe the crystals which may be obtained from it, by purification, "to be simply *myristic acid,* impregnated with a little essential oil, which they obstinately retain." Orris rhizome also contains *resin* and some *tannic acid.*

Medical Properties and Uses.—Orris rhizome possesses cathartic and emetic properties, and was formerly much used on the Continent, &c., in dropsies, &c., and also, when powdered, as an errhine. It has been recently recommended by M. Allisiardi, of Saluzzo, in Italy, as a febrifuge. In France it is a good deal used for making issue-peas, for which purpose its agreeable odour, acridity, and power of absorbing moisture render it well adapted. It is sometimes given to infants during teething, to rub their gums with; but this practice is objectionable, since it is not unfrequently attended with irritation of the mouth and disorder of the stomach and bowels.

Its chief application is at the present day to cover unpleasant odours in the breath, as an ingredient in tooth powders, and as a perfume; for the latter purpose it is largely employed. An agreeable perfume, known as *essence of violets*, may be prepared by digesting one part of powdered orris rhizome in eight parts of rectified spirit.

Per. Mat. Med., vol. ii, part 1, p. 220; Steph. & Church., by Burnett, vol. i, pl. 27; Pharmacographia, pp. 599 & 601; U. S. Disp., by W. and B., p. 498; Per. Mat. Med., by B. and R., p. 446; Groves, in Ph. Jl., vol. iii, ser. 3, p. 229.

DESCRIPTION OF PLATE.

Drawn from specimens grown in Kew and Chelsea Gardens.

1. Flower with the perianth-segments removed.
2. Transverse section of ovary.

Iris versicolor, *Linn.*

Blue Flag (of America).

Official Part and Name.—The rhizome of this plant, which is

found in Canada and all parts of the United States of America, is also official, as follows :—IRIS VERSICOLOR. The rhizome (U. S. P. *Secondary*).

General Characters and Composition.—The fresh rhizomes resemble in appearance those of *Iris florentina* and the other species of *Iris* which form the orris just described, and like them they have an acrid taste, and no marked odour. Their properties are imparted to some extent to water by boiling, but more perfectly to alcohol; but we have no reliable evidence of their composition. By keeping, their acrimony and medical virtues are said to be impaired.

Medical Properties and Uses.—Blue flag rhizome possesses similiar medical properties to the orris rhizome already described, being purgative and emetic. But although official in the United States Pharmacopœia, it is but little employed in regular practice. Its chief use is by the class of irregular practitioners known in the United States as "Eclectics," who prepare from it an oleo-resin called *iridin* or *irisin*, which is believed to unite cholagogue and diuretic with aperient properties, and which a correspondent of the *Lancet* states to cause effects similar to those of a mixture of blue pill, aloes, and rhubarb.

U. S. Disp., by W. & B., p. 499; Lancet, Aug. 30, 1862, p. 239.

D.Blair ad nat. del. et lith.

M&N.Hanhart imp.

BRASSICA NIGRA, *Boiss.*

N. Ord. CRUCIFERÆ.

Tribe *Brassiceæ*.

Genus **Brassica**, *Linn.** B. & H., Gen. i, p. 84; Baillon, Hist., iii, p. 185. Species variously estimated, 80 to 150, natives of the temperate regions of the Old World. Includes *Sinapis*, *Erucastrum*, &c.

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22. **Brassica** (*Sinapis*†) **nigra**, *Koch, in Röhling, Deutschl. Flora*, iv, *p.* 713 (1833).

Black, Brown, or Red Mustard.

Syn.—Sinapis nigra, *Linn., and many authors.* Brassica sinapioides, *Roth.* Melanosinapis communis, *Spenn.*

Figures.—Woodville, t. 146; Steph. & Ch., t. 42; Hayne, viii, t. 40; Nees, t. 403; Berg, Charact., t. 84, f. 605; Berg and Sch., t. 30 e; Syme, E. B., i, t. 85.

Description.—A large branching annual, often four feet high, stem and spreading branches stiff, dark green, more or less hispid below, usually glabrous above. Lowest leaves lyrate, slightly hispid, with a large terminal segment, intermediate ones irregularly pinnatifid, upper ones lanceolate, all stalked, dark green, margin (except of the uppermost ones) faintly serrate. Flowers in corymbose racemes, stalked, small (not ¼ inch in diameter), ebracteate, pedicels shorter than calyx. Sepals 4, narrowly oblong, pale green, spreading almost horizontally. Petals 4, alternating with sepals, with a narrow claw and roundish blade, bright yellow, spreading. Stamens 6, hypogynous, tetradynamous, the two with short filaments lateral, inserted lower than the others, with a small gland placed above the base of each, the four with longer filaments placed in pairs antero-posteriorly, with a large gland at the base of each pair; anthers versatile. Pistil oblong-ovoid, tapering into a short style; stigma capitate, bilobed; ovary 1-celled, with two parietal placentæ; ovules several. Fruit a siliqua, about ¾ inch long,

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* *Brassica*, the Latin name for a cabbage.

† *Sinapis*, Greek σίναπι or νᾶπυ, mustard.

oblong-linear, erect or adpressed to the axis of the raceme, somewhat quadrangular, glabrous, tipped with a short tapering beak, dehiscent by two valves, each of which is keeled by a single dorsal vein, 2-celled, with 3—7 seeds in a single row in each cell, and none in the beak. Seeds roundish-oval, about $\frac{1}{25}$ inch in diameter; testa dark, brownish-red, minutely pitted to the naked eye; embryo large, the cotyledons conduplicate, the outer one larger and enclosing the inner, which is folded round the bent-up radicle; endosperm none.

Habitat.—Black mustard is a weed in waste and cultivated ground throughout England and the South of Scotland, but is perhaps doubtfully native here. It grows throughout Europe, except the extreme north-east parts, Asia Minor, North-West India, South Siberia, and North Africa, and has become naturalised in North and South America. It is cultivated in England in Lincolnshire and Yorkshire, and in parts of Germany Holland, and Italy.

The genus *Sinapis* cannot be kept separate from *Brassica* by any satisfactory characters.

DC. Syst., ii, p. 608; Syme, E. B., i, p. 126; Hook. f., Stud. Fl., p. 30; Watson, Comp. Cyb. Br., p. 104; Gr. & Godr., Fl. France, i, p. 77; Hook. f., Fl. Ind., i, p. 156; Lindl., Fl. Med., p. 92.

Official Parts and Names.—1. SINAPIS; the seeds of Sinapis nigra, *Linn.*, and Sinapis alba, *Linn.*, reduced to powder, mixed: 2. OLEUM SINAPIS; the oil distilled with water from the seeds of Black Mustard, Sinapis nigra, *Linn.*, after the expression of the fixed oil (B. P.). A mixture of the seeds of both the above species reduced to powder (*Sinapis, Mustard*) (I. P.). SINAPIS NIGRA; the seeds of Sinapis nigra (U. S. P.).

1. SINAPIS.—Mustard being a mixture of the powdered seeds of both Sinapis nigra, *Black Mustard,* and Sinapis alba, *White Mustard,* we shall reserve our notice of this substance until we have described separately the characters of the two kinds of seeds of which it is composed. (See *Sinapis,* under *Sinapis alba.*)

General Characters and Composition of Black Mustard Seeds.—Black mustard seeds, or as they are also sometimes termed *Brown*

and *Red mustard seeds*, are very small, and roundish in form. Externally they have a deep reddish-brown colour, or sometimes greyish, the surface being reticulated with minute pits; internally they are yellow. Their powder has a greenish-yellow colour. In the entire state they are inodorous, and even when powdered dry; but when the seeds are triturated with water they exhale a strong pungent odour so as to affect the eyes, and in some cases even to cause a flow of tears. When masticated their taste is at first bitterish, which is immediately followed by pungency.

Black mustard seeds yield by expression an inodorous, non-drying *fixed oil*, with a mild oily taste. The amount of oil thus obtainable by pressure averages 25 per cent. The seeds also contain a crystalline substance, commonly known under the name of *myronate of potash*, but better characterised as *sinigrin*; and an albuminous body closely resembling the emulsin of almonds, and termed *myrosin*. Sinigrin, as shown by Will and Korner, is a compound of *Sulphocyanide of Allyl*, *Bisulphate of Potassium*, and *Sugar*. There is no starch in the ripe seeds. The pungent principle upon which the properties of black mustard seeds essentially depend does not pre-exist in the seeds, but is obtained in the form of a volatile oil when the macerated seeds are distilled with water (see *Oleum Sinapis*). The fact that the pungent volatile oil does not pre-exist in the seeds explains their want of odour in a dried state.

2. Oleum Sinapis.—The volatile or essential oil of mustard, which is official under the name of *oil of mustard*, does not pre-exist in black mustard seeds, as just stated, but is produced whenever water is added to the powdered seeds by the action of myrosin on the sinigrin, just as the volatile oil of almonds (see *Oleum Amygdalæ Amaræ*) is formed under the same circumstances by the action of emulsin on amygdalin. The temperature of the water used should not exceed 122° Fahr., as a much higher degree of heat prevents altogether the formation of the oil. It is to this oil that the pungent smell and taste of black mustard, as well as its inflammatory action on the skin, is due. Oil of mustard is colourless or pale yellow, of an exceedingly pungent odour, and a most acrid and pungent taste.

It boils at about 298° Fahr., and has a specific gravity of 1·015 at 68° Fahr. It is readily soluble in alcohol and ether, but only very slightly so in water. It contains sulphur as one of its constituents, and is regarded by chemists as a *sulphocyanide of allyl.*

Medical Properties and Uses.—Black mustard seed is a powerful stimulant. It is rarely employed in a pure state, but usually in the form of Flour of Mustard, which, as commonly prepared for the table, is a mixture of both black and white mustard seeds. This is also the composition of the official mustard of the British Pharmacopœia. Pure flour of black mustard may, however, be obtained from the manufacturers. The properties and uses of mustard are more fully described under the head of *Sinapis* in *Sinapis alba.* Mustard paper (*Charta Sinapis*), has been recently introduced into the appendix of the British Pharmacopœia and into the United States Pharmacopœia. It is prepared by coating the surface of cartridge-paper with a mixture formed by adding Black Mustard seeds in powder to a solution of gutta percha. It is an imitation of Rigollot's mustard leaves which have been extensively used for some years as a ready, simple, cleanly, and safe rubefacient.

The oil of mustard when applied to the skin in its pure state produces almost instant vesication ; but when dissolved in rectified spirit, or spirit of camphor, or employed in the form of the Compound Liniment of Mustard of the British Pharmacopœia, it is a very useful application for chilblains, chronic rheumatism, &c. When this liniment is slightly sprinkled on impermeable piline, and applied to the skin, it also forms an elegant substitute for a mustard poultice.

Per. Mat. Med., by B. & R., p. 935 and 1076; Pharmacographia, p. 62; U. S. Disp., by W. & B., p. 809; Garr., Mat. Med., p. 208.

DESCRIPTION OF PLATE.

Chiefly drawn from a specimen collected at Warnham, Sussex. 1. Portion of the flowering plant. 2. A diagram of the flower. 3. The andrœcium and pistil. 4 and 5. Ripe fruit. 6. The same, with one valve removed. 7. A seed. 8. Section of the same. 9. The embryo. (5—9 enlarged.)

D.Blair ad nat. del. et lith.

M. & N. Hanhart imp.

N. Ord. CRUCIFERÆ.
Tribe *Brassiceæ*.
Genus Brassica, *Linn.*

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23. Brassica (*Sinapis*) alba, *Hook. f. & T., in Hook. f., Fl. Brit. Ind., i, p.* 157 (1872).

White Mustard.

Syn.—Sinapis alba, *Linn., and most authors.* Leucosinapis alba, *Spach.*

Figures.—Steph. & Ch., t. 42; Nees, t. 402; Hayne, viii, t. 39; Berg, Charact., t. 85, f. 606; Curt., Fl. Lond., fasc. 5; Syme, E. B., i, t. 84.

Description.—An erect annual, usually about 2 feet high, with a few ascending branches, stiff, bright green, bristly, with reflexed hairs throughout. Leaves all stalked, pinnatifid, the lowest ones with the terminal lobe large, and the divisions reaching to the midrib, uppermost ones less deeply cut, rough with hairs. Flowers as in *B. nigra*, but twice as large, and pedicels considerably longer; petals much paler yellow; pistil hairy below, a little longer than the stamens. Siliquas 1—1½ inches long, on divaricate stalks, spreading, the lower half beaded with the 4—6 contained seeds, the upper half occupied by a flat, vertical, nearly smooth beak, curved upwards, which often has a seed contained in its base, valves short, with 3 prominent veins, strongly bristly. Seeds subglobular, about $\frac{1}{10}$ inch in diameter, pale yellow; testa smooth to the naked eye; embryo as in *B. nigra*, green.

Habitat.—White mustard is readily distinguished from black by its smaller size, much larger flowers and seeds, and spreading hispid pods with a long falcate beak. Like the latter plant it is a frequent weed in England, but is more restricted to cultivated ground, being especially a cornfield plant in calcareous districts; and has perhaps still less claim to be considered a British plant. It occurs throughout Europe, especially in the south, where it is probably native, and in Asia Minor, Algeria, and China, and is cultivated in England (Essex and Cambridgeshire) and in the

United States, where it has escaped and occurs as an occasional weed.

DC. Syst., ii, p. 620; Syme, E. B., i, p. 125; Hook. f., Stud. Fl., p. 30; Watson, Comp. Cyb. Br., p. 104; Hook. f., Fl. India, i, p. 157; Gren. & Godr., Fl. France, i, p. 74; Lindl., Fl. Med., p. 92.

Official Parts and Names.—SINAPIS; the seeds of Sinapis nigra, *Linn.*, and Sinapis alba, *Linn.*, reduced to powder, mixed (B. P.). A mixture of the seeds of both the above species reduced to powder (*Sinapis, Mustard*) (I. P.). SINAPIS ALBA; the seed of Sinapis alba (U. S. P.).

SINAPIS ALBA.—White mustard seeds are much larger than those of black mustard seeds. They are roundish in form, of a yellow colour, and very finely pitted in a reticulate manner on their surface; internally they are bright yellow. They are inodorous when entire, and almost entirely so even when triturated with water, as no volatile principle is then formed as with black mustard seeds under the same circumstances. Their taste is similar to, but less pungent than, black mustard seeds.

White mustard seeds yield by expression a similar *fixed oil* to that obtained from black mustard seeds. They also contain *myrosin*, but no *myronate of potash* or *sinigrin*, and hence no volatile oil can be obtained from them by distillation. From the investigations of Will it would appear that white mustard seeds owe their peculiarity to the presence of a crystalline principle, called *Sinalbin* or *sulpho-sinapisin*, which is a compound of three bodies, namely, *Sulphocyanate of Acrinyl, Sulphate of Sinapin*, and *Sugar*. When sinalbin is placed in contact with water and myrosin at ordinary temperatures it is resolved into its three constituent substances; but the sulphocyanate of acrinyl, which is the active principle of white mustard seeds, does not pre-exist in the seeds, and cannot be obtained from them by distillation. It is owing to the presence of sulphocyanic acid that the infusion of white mustard seeds becomes of a bright red colour when a persalt of iron is added to it. An infusion of black mustard seeds under the same circumstances only assumes an orange tint.

Medical Properties and Uses.—Similar to, but milder than, those of black mustard seeds. When swallowed whole they

operate as a laxative, and have been used as a remedy in dyspepsia, and in other complaints attended with torpidity of the bowels. But their use in this state is by no means free from danger, as they sometimes accumulate in the intestines, and have produced fatal effects. They are chiefly used when mixed with black mustard seeds in the form of the official mustard (*Sinapis*), which see.

The seed-leaves of *Sinapis alba* and of *Lepidium sativum* are used as a salad under the name of *mustard and cress.*

Sinapis.—*Flour of mustard,* or as it is commonly termed *mustard,* was formerly supposed to be prepared solely from black mustard seeds, but whatever may have been the case, the ordinary commercial mustard is now always manufactured from a mixture in varying proportions of both black and white mustard seeds. This mixture, as we have seen, also constitutes the official mustard of the British Pharmacopœia.

Manufacture.—The following method of preparing mustard was furnished to Dr. Pereira by a manufacturer :—The seeds of black and white mustard are first crushed between rollers, and afterwards pounded in mortars. The pounded seeds are then sifted. The residue in the sieve is called *dressings* or *siftings ;* what passes through is *impure flour of mustard.* The latter by a second sifting yields *pure flour of mustard,* and a second quantity of dressings.

General Characters.—The characters of mustard as given in the British Pharmacopœia are as follows :—" Greenish-yellow, of an acrid bitterish oily pungent taste, scentless when dry, but exhaling when moist a pungent penetrating peculiar odour, very irritating to the nostrils and eyes. A decoction cooled is not made blue by tincture of iodine." The latter test is added for the purpose of detecting flour or starch, as the mustard of commerce is frequently adulterated with these substances, which are coloured by turmeric, and rendered hot by capsicum. The chemical characters of mustard and the sources of its active properties have been already referred to when treating separately of the chemical composition of black and white mustard seeds.

Medical Properties and Uses.—The properties and uses of both black and white mustard seeds have been already treated of

separately, but we have now to describe those of mustard generally. Mustard acts as a powerful stimulant, holding, according to Pereira, an intermediate rank between horseradish and pepper. Externally applied it is a most valuable rubefacient, and if kept long in contact with the skin it causes vesication; but its use requires caution, as its too lengthened application may occasion ulceration and even gangrene.

Mustard is used in medicine for several purposes. As an emetic mustard is especially valuable when there is great torpor of the stomach, and in other cases where it is desirable to empty that organ without producing a depressing influence in the system, as in narcotic poisoning, and some forms of paralysis, &c. It has also been employed as a diuretic in dropsies, and in other ways; but the principal use of mustard is as a rubefacient, and in the form of a mustard poultice its application is useful to relieve slight inflammation of serous and mucous surfaces when applied to a neighbouring part; as for example, upon the chest in bronchitis and pleurisy; also to relieve congestion of various organs by drawing blood to the surface, as in head affections; and likewise for the alleviation of neuralgic and other pains and spasms. Mustard is also frequently added to local baths, as for the feet. (See also *Oleum Sinapis.*)

Besides its use in medicine mustard is very largely employed as a condiment, and when taken in moderate quantities with the food, it promotes the appetite, and assists the assimilation of substances which are difficult of digestion.

Per. Mat. Med., vol. ii, part ii, p. 582; U. S. Disp., by W. & B., p. 810; Per. Mat. Med., by B. & R., p. 937; Pharmacographia, p. 65; Garr., Mat. Med., p. 209; Greenish, in Pharm. Journ., vol. 3, ser. 3, p. 782, and vol. 4, p. 381.

DESCRIPTION OF PLATE.

Made from a specimen collected at Box Hill, Surrey. 1. The androecium and pistil. 2. A ripe fruit. 3. Horizontal section of the same. 4. A seed. 5 Section of the same. 6. The embryo. (1, 4, 5, 6 enlarged.)

D.Blair art nat del et lith.

M & N.Hanhart imp

N. Ord. LINACEÆ. Lindl., Veg. K., p. 485; Le Maout & Dec., p. 293; Baill., Hist., pl. v.

Tribe *Lineæ*.

Genus Linum, *Linn.** B. & H., Gen., i, p. 242; Baill., l. c., p. 42. Species 80 or more, natives of either hemisphere, and chiefly extra-tropical.

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39. Linum usitatissimum, *Linn., Sp. Pl., ed.* 1, *p.* 277 (1753).

Flax. Cultivated Flax.

Figures.—Woodville, t. 202; Steph. & Ch., t. 61; Nees, t. 389; Hayne, viii, t. 17; Berg & Sch., t. 18 e; Curt., Fl. Lond., fasc. 5; Syme, E. B., ii, t. 292; Baillon, l. c., figs. 69—75.

Description.—A stiff, upright annual, about 1—2 feet high; stem usually solitary, cylindrical, quite smooth, green, corymbosely branched in the upper part. Leaves alternate, sessile, linear-lanceolate, attenuate at each end, ¾—1½ inch long, entire, smooth, faintly ribbed. Flowers solitary at the ends of the branches. Sepals 5, imbricate, ovate, with attenuated points; outer ones narrower, strongly 3-nerved, margins broadly membranous. Petals 5, twisted, large, fugaceous, shortly clawed, veined, deep violet-blue, slightly crenate at the margin. Stamens 5, alternate with the petals, the filaments more or less connected into a short tube at the base, with 5 abortive or rudimentary stamens (staminodes) alternating with them; anthers small, versatile, dark blue. Ovary flask-shaped, 5-celled at the base, with a thick axis; ovules 2 in each cell, collateral, attached to the upper part of the axis; styles 5, distinct. Fruit capsular, surrounded at the base by the persistent sepals, globose, with a sharp-pointed apex, smooth, imperfectly 10-celled; pericarp thin, tough, papery, splitting septicidally into its component carpels and partially down the back of each carpel through the spurious partitions formed between the pairs of seeds. Seeds ¼—⅙ of an inch long, flattened-ovoid, with rounded edges and an oblique blunt beak at the

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* *Linum*, the classical name.

upper end; testa bright brown, smooth, shining; embryo green, occupying almost the whole seed, surrounded with a very thin layer of endosperm; cotyledons large, flat; radicle straight, superior.

Habitat.—The native country of the cultivated Flax is impossible to determine, and its cultivation reaches back to the remotest periods of history. It readily escapes, and is found in a quasi-wild condition in all the countries where it is grown, but is nowhere known as truly spontaneous. It is possible, as supposed by Prof. Heer, that it is a cultivated race developed from *L. angustifolium*, Huds., a frequent wild plant in southern and western Europe (including England), the plants known as *L. ambiguum*, Jord., *L. hyemale romanum* and *L. humile*, Mill., being the successive connecting links. De Candolle suggests that more than one species have been in cultivation. The plant cultivated in India is stated to have some characters of *L. humile*, Mill. Flax is now extensively cultivated in both temperate and tropical climates, *e. g.* in Russia, Egypt, throughout India, the United States, the south of Europe, Holland, and England. In this country it frequently occurs by roadsides and in waste ground, but is nowhere permanent.

Syme, E. B., ii, p. 184; Hook. f., Stud. Fl., p. 74; Watson, Comp. Cyb. Br., p. 493; Lowe, Fl. Mad., i, p. 98; Oliv., Fl. Trop. Afr., i, p. 268; Hook. f., Fl. Brit. Ind., i, p. 411; Journal of Botany, 1874, p. 87; Lindley, Fl. Med., p. 129.

Official Parts and Names.—1. LINI SEMINA; the seeds: 2. LINI FARINA; the cake of linseed from which the oil has been pressed, reduced to powder: 3. OLEUM LINI; the oil expressed without heat from Linseed (B. P.). The seeds (*Lini Semina*) (I. P.). 1. LINUM, *Flaxseed;* the seed: 2. LINI FARINA; the meal prepared from the seed: 3. OLEUM LINI; the fixed oil obtained from the seed (U. S. P.).

1. LINI SEMINA.—Linseed is imported into this country in enormous quantities, chiefly from Russia and India, but to some extent also from Germany, Holland, and other countries. Thus, the total value of imports from Russia in 1872 was about

£3,000,000; from India during the same year £1,144,942; and from Germany and Holland £144,108; the total quantity imported being 1,514,947 quarters, representing a money value of £4,513,842. Some seed is also produced in Great Britain, but the cultivation of the flax plant is declining in this country. Several varieties of linseed are known in the markets, and of these English, Calcutta, and Bombay, fetch the highest prices.

General Characters and Composition of Linseed. — Linseed, Lintseed, or Flaxseed, is small, although varying in length from $\frac{1}{4}$—$\frac{1}{6}$ of an inch, the seed from warm countries being the largest. The seeds are more or less flattened, and have a smooth shining surface of a brown colour; internally they are yellowish-white; they have a mucilaginous oily taste, but no odour. The characters of the seed should be carefully noted, as linseed is very much adulterated with rape, mustard, and other seeds, from which it should be carefully separated. In America a variety of flaxseed is met with which has a greenish-yellow instead of the ordinary brown colour. In other respects it does not appear to differ essentially from the common seed.

The principal constituent of linseed is the *fixed oil* (see *Oleum Lini*), which forms about one third of its weight. The other important constituent is a peculiar *mucilage*, which appears to be a product of the transformation of starch, for while starch is found in unripe linseed it is altogether absent from the ripe seed; hence a decoction of linseed does not become blue by the action of iodine, and hence also a means of detecting mealy seeds and cereal grains when mixed with linseed.

Medical Properties and Uses.—Linseed possesses emollient and demulcent properties, and is largely employed in the form of an infusion which is commonly known as *linseed-tea*, in irritation and inflammatory conditions of the mucous membranes generally, as in catarrhs and urinary affections, and in diarrhœa and dysentery. Linseed tea may be made more palatable by the addition of sliced lemon and sugar-candy.

2. Lini Farina.—The *cake* left after the oil has been expressed from linseed is usually called *oil-cake*; this when ground to powder

forms the *linseed meal* of the British Pharmacopœia. In the United States Pharmacopœia the seeds are simply directed to be ground, and the meal, which is there called *flaxseed meal*, consequently differs from that of the British Pharmacopœia in containing the oil. The meal containing the oil is to be preferred when used fresh, but it soon becomes rancid by the formation of fatty acids from the oxidation of the contained oil. Linseed meal is greyish-brown in colour.

Linseed meal is a valuable emollient application. It is very largely used in the form of a poultice to inflamed and suppurating surfaces. It is also employed when mixed with water for luting by chemists. Oil-cake, from containing about 30 per cent. of protein substances, equivalent to 5 per cent. of nitrogen, forms a very valuable food for cattle, for which purpose it is largely employed.

3. Oleum Lini.—Linseed or flaxseed oil is usually obtained on a large scale by first roasting the seeds to destroy the mucilaginous matter contained in their coats, and then submitting them to pressure, when they yield from 20 to 30 per cent. of oil according to the quality of the seed. The best oil is, however, obtained by pressing the seeds without previous heating, but the yield is not so great, averaging less than 20 per cent. under such circumstances. The oil when obtained without heat is of a very pale amber colour, and when fresh has but little taste or odour; but commercial oil is usually of a dark yellowish-brown colour, and has a disagreeable odour and a nauseous acrid taste. Its specific gravity is about 0·932. It is soluble in alcohol, but more readily so in ether, and has the property when exposed to the air of drying into a hard transparent varnish, more especially after having been boiled, and still more after having been heated with oxide of lead. Its essential constituents are *glycerin* and fatty acids, more especially *linoleic acid*, to which it owes its drying property.

Linseed oil is emollient in its action, and is a valuable application to burns or scalds, either alone or mixed with an equal volume of solution of lime (lime-water). This mixture is commonly known

under the name of *Carron Oil*. Linseed oil, however, is principally used in painting, on account of its drying property, and in the manufacture of printers' ink.

4. Other Products of the Flax Plant.—The value of the flax plant is not confined to its seeds, but its *liber-fibres* when properly prepared constitute *flax* of which linen fabrics are made. The consumption of flax for this purpose is enormous; even in this country alone in 1873, besides the flax obtained from home cultivation, we imported 2,194,000 cwt. Linen when scraped forms *lint*, which is so valuable for surgical dressings, and the short fibres which are separated in the course of its preparation constitute *tow*, which is much employed in pharmacy, surgery, and for other purposes.

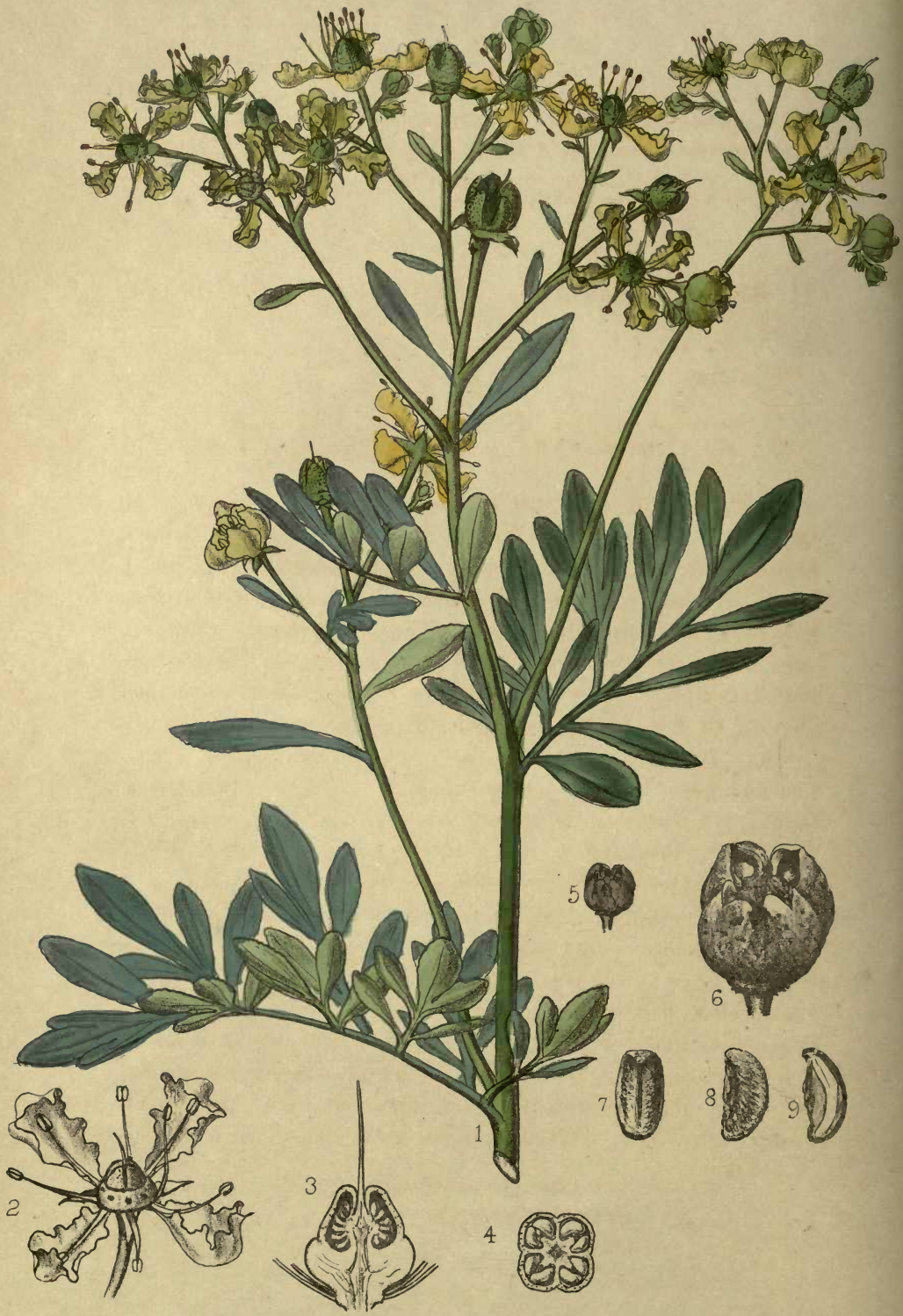
Per. Mat. Med., by B. & R., p. 924; Pharmacographia, p. 90; U. S. Disp., by W. & B., pp. 528 and 598; Greenish, in Year Book of Pharmacy, 1871, p. 590.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in the Garden of the Royal Botanic Society, London.

1. Diagram of flower (the sepals should have been shown imbricate and the petals convolute in this figure).
2. Andrœcium and pistil.
3. Vertical, and—4. Transverse section of ovary.
5 and 6. Ripe fruit.
7. Section across the same.
8. Seed.
9, 10, and 11. Sections of the same.

(2—4 and 6—11 enlarged.)



D.Blair, ad nat. del et lith.

M&N.Hanhart imp.

RUTA GRAVEOLENS, *Linn.*

N. Ord. RUTACEÆ.

Tribe *Ruteæ*.

Genus Ruta, *Linn.** B. & H. Gen., i, p. 286; Baill., Hist., pl. iv, p. 373. Species 40 or more, natives of Western Asia and the Mediterranean region.

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44. Ruta graveolens,† *Linn., Sp. Pl., ed.* 2, *p.* 383 (in part) (1753).

Rue.

Figures.—Woodville, t. 174; Steph. & Ch., t. 71; Hayne, vi, t. 8; Nees, t. 376; Berg & Sch., t. 24 f.; Baill., l. c., figs. 391—397.

Description.—A perennial herbaceous or half-shrubby plant, reaching 2 or $2\frac{1}{2}$ feet in height. Stems cylindrical, slender, branched in the upper part, quite smooth, pale glaucous green, somewhat shrubby at the base, and there covered with a grey bark. Leaves alternate, without stipules, compound, the lower ones tripinnate, the upper ones sub-bipinnate or pinnate, the highest simple, leaflets linear-oval or oblong, the terminal ones obovate, all dotted with small pellucid glands, rather thick, bluish-green. Inflorescence a terminal corymbose irregularly trichotomous cyme. Flowers on long stalks, erect, nearly an inch across. Calyx of 4 (or 5) sepals, slightly connected, narrow, acute, semi-persistent. Petals alternating with the sepals which they greatly exceed, distant, widely spreading, greenish-yellow, wide and hooded at the top, suddenly contracted into a narrow claw below, the margin more or less wavy and sometimes toothed. Stamens twice as many as the petals, 8 (or 10), inserted below the hypogynous disk, half opposite the sepals, half opposite the petals, in the concave limbs of which they are at first contained; filaments slender, glabrous, at length straight and exceeding the petals. Pistil surrounded at the base and supported by a thick fleshy green sticky disk, marked opposite each stamen with a deep

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* *Ruta*, the classical name.

† *graveolens*, strong-smelling.

nectariferous pore ; ovary large, 4- (or 5-) lobed, the lobes (carpels) separate above, strongly dotted with sunk glands, 4-celled, ovules numerous on axile placentas ; styles coming off from the inner side of the carpels, combined into a single body tapering to the apical stigma. Fruit dry, hard, roundish, 4- or 5-lobed at top, greyish-brown, rough, each carpel dehiscing from above ventrally and also for some way down the dorsal suture. Seeds ovoid, rounded on the back, flattish in front, angular, testa blackish, rough ; embryo slightly curved from base to apex, surrounded by scanty fleshy endosperm.

The central terminal flowers of the corymbs are usually 5-merous, the others generally 4-merous.

Habitat.—The common Rue grows in waste stony ground throughout the south of Europe, extending from Spain and Portugal to Greece and the Crimea. It also occurs in the Canaries, and is cultivated in gardens in India and other countries. In this country it is very hardy and one of our oldest garden plants, usually continuing green through the winter, and the empty dry capsules remaining on the withered flower-stalks through the next flowering season.

Boiss., Fl. Orient., i, p. 921 ; Hook. f., Fl. India, i, p. 485 ; Lindl., Fl. Med., p. 210.

Official Parts and Names.—Oleum Rutæ ; the oil distilled from the fresh herb (B. P.). The herb (*Ruta*) (I. P.). Ruta ; the leaves (U. S. P.).

1. Ruta.—The fresh herb has a very strong disagreeable odour, especially when rubbed ; and a bitter, acrid, nauseous taste. When dried its odour is similar, but less powerful, and it has a greyish-green colour.

The principal constituents of Rue are the *volatile oil* (see *Oleum Rutæ*), on which its properties essentially depend, and a *bitter extractive matter* which is soluble in water, but insoluble in alcohol and ether.

2. Oleum Rutæ.—By distillation with water the fresh herb yields a small quantity of volatile oil, the produce being largest

when the fruits are fully formed, but only about 0·50 per cent. can even then be obtained. Oil of Rue has a pale yellow colour when fresh, but it becomes brown by keeping. Its odour is strong and disagreeable, like that of the herb; and it has an acrid and nauseous taste. Its specific gravity is stated by Kane to be 0·837 at 18°, but Pereira gives it as 0·911.

Medical Properties and Uses.—The herb and the oil act as stimulants, their influence being chiefly directed to the uterine and nervous systems. Rue has also been regarded as anthelmintic; and in excessive doses it is an acro-narcotic poison. When fresh its topical action is that of an acrid; so greatly so, indeed, that if much handled it causes redness, swelling, and even vesication. Rue was formerly much employed, but it is rarely prescribed at the present day, although *rue tea* is still a popular remedy. It may be given in hysteria, amenorrhœa, epilepsy, flatulent colic, infantile convulsions, &c., and appears to have fallen too much into disuse. The oil is the best form of administration; it may also be used externally as a rubefacient.

The ancients employed rue as a condiment, and for ages it was regarded as most beneficial in warding off contagion, and even now is sometimes used to keep off noxious insects.

Per. Mat. Med., vol. ii, part ii, p. 396; U. S. Disp., by W. & B., pp. 748 and 1312; Garr. Mat. Med., p. 225.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in the Royal Botanic Society's Garden.

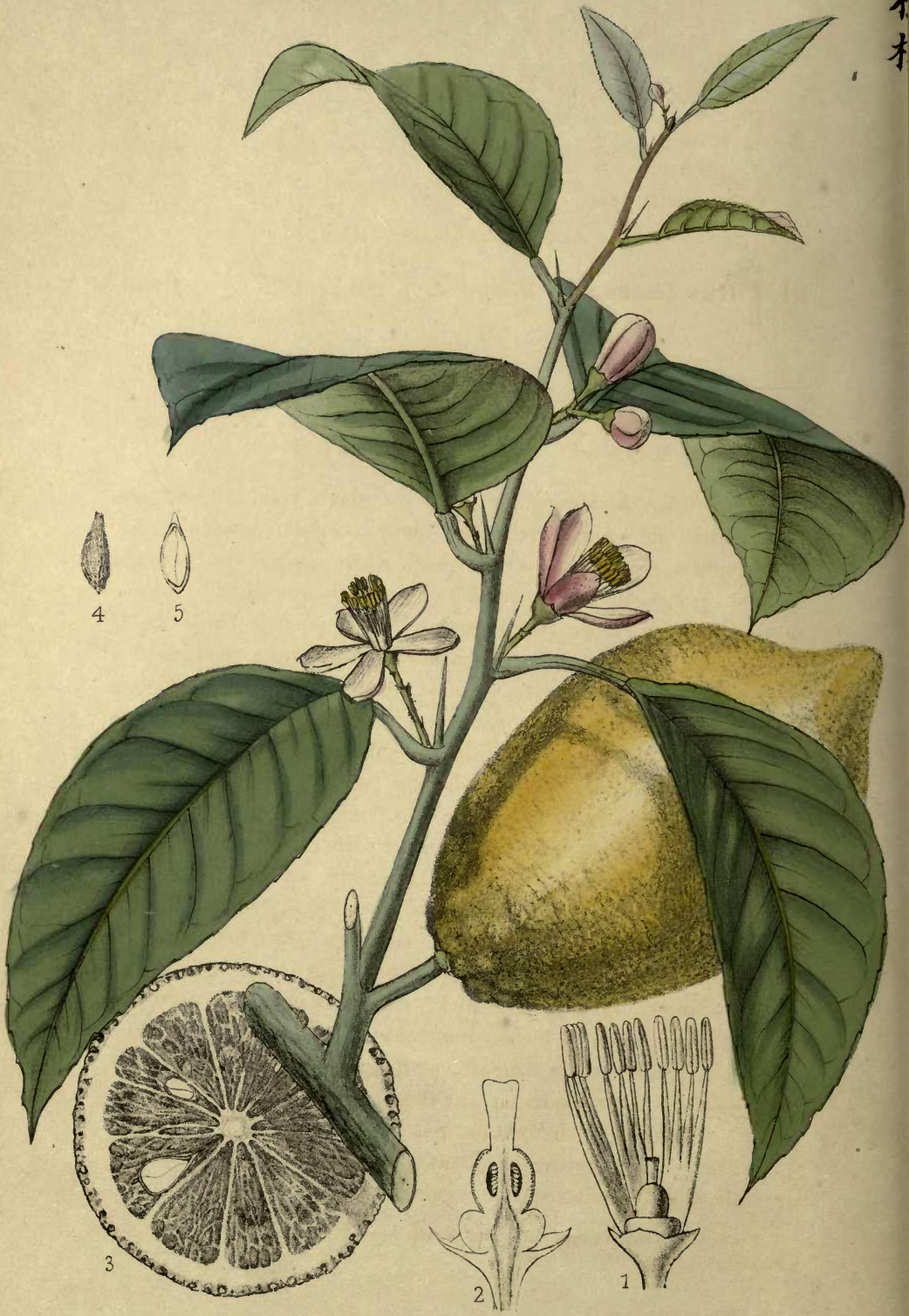
1. A flowering stem.
2. A flower.
3. Vertical section of the pistil.
4. Transverse section of the ovary.

5 and 6. Ripe capsule.

7 and 8. A seed.

9. Vertical section of the same.

(2—4, and 6—9 enlarged.)



D. Blair ad. viv. del.ᵗ et lith.

M & N Hanhart imp.

CITRUS LIMONUM, *Risso.*

N. Ord. RUTACEÆ.
Tribe *Aurantieæ*.
Genus Citrus, *Linn.*

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54. Citrus Limonum,* *Risso*, l. c., p. 201 (1813).

Lemon.

Syn.—C. medica, var. *β*, *Linn.* C. acida, *Roxb.*

Figures.—Woodville, t. 89; Steph. & Ch., t. 92; Nees, t. 424; Hayne, xi, t. 27; Berg & Sch., t. 31 f; Risso, Oranges, tt. 70—95.

Description.—A straggling bush or small tree, 10—12 feet high, with numerous, irregular, short, angular branches, and sharp spines in the leaf-axils; bark clear grey, the younger branches green, the twigs reddish or purplish, glabrous. Leaves somewhat scantily produced, evergreen, alternate, blade 2—2½ inches long, ovate-oval, acute, rather yellow green, margin distinctly but distantly serrate, articulated with the petiole, which is about ½ an inch long and not, or very slightly, winged. Flowers solitary, rarely 2 or 3 together, in the axils, on longish peduncles, frequently unisexual. Calyx shallow, with 5 spreading teeth, persistent. Petals 5, less than ¾ of an inch long, oblong, spreading, white above, strongly tinged with purplish-pink externally. Stamens 20—40; filaments nearly as long as petals, separate, or more or less united into fours, hypogynous. Ovary supported on and surrounded at the base by a large, firm, rounded disk, about 10-celled, with several descending ovules in each as in the orange; style short, thick. Fruit, a rounded, ovoid, or obovoid berry, about 3 inches long, usually with a nipple-shaped extremity, bright yellow, smooth, with depressed punctations over the oil-glands; structure as in the orange; pulp acid, pale yellow. Seeds as in the orange, but smaller.

Habitat.—As a cultivated plant the lemon is now met with throughout the Mediterranean region, and in Spain, Portugal, the

* From the Arab *Limun* or *Limu*, which is said to have its origin in the Sanskrit *Nimbuka*.

Canaries, the Azores, and in all tropical and subtropical countries, but it appears that there is no certain notice of it in Europe before the latter part of the 15th century. The wild stock is native in the north-west provinces of India, ascending to 4000 feet in the mountains, where several forms are met with in a natural state. Under cultivation numerous races have been produced, of which Risso and Poiteau enumerate no less than 47, though they maintain as distinct the Sweet Limes (*C. Limetta*, Risso, with 8 varieties, and *C. Lumia*, Risso and Poit., with 12 varieties). These "sweet" Lemons differ, however, only in their fruit possessing an insipid instead of an acid juice. The Lemon is a more tender plant than the orange, but is frequently grown in our conservatories; it flowers and fruits nearly all the year round, and the scent of the flowers is very sweet, but quite distinct from that of orange blossoms.

Hook. f., Fl. India, i, p. 515; Brandis, Forest Fl., p. 51; Lowe, Fl. Madeira, i, p. 72; Lindl. Fl. Med., p. 164.

Official Parts and Names.—1. LIMONIS CORTEX; the outer part of the rind of the fresh fruit: 2. OLEUM LIMONIS; the oil expressed or distilled from fresh lemon peel: 3. LIMONIS SUCCUS; the freshly expressed juice of the ripe fruit (B. P.). 1. The outer part of the rind of the ripe fruit (*Limonis Cortex*): 2. The essential oil of the rind (*Limonis Oleum*): and, 3. The expressed juice of the ripe fruit (*Limonis Succus*) (I. P.). 1. LIMONIS CORTEX; the rind of the fruit: 2. OLEUM LIMONIS; the volatile oil obtained from the rind of the fruit: 3. LIMONIS SUCCUS; the juice of the fruit (U. S. P.).

Commerce and Varieties of the Lemon.—Lemons are imported into this country from southern Europe, principally from Sicily, but to some extent from Spain and other parts. The lemons are packed in chests, each lemon being rolled separately in paper. There are numerous varieties, the more important of which are the Wax Lemon, the Imperial Lemon, and the Gaeta Lemon.

1. LIMONIS CORTEX. *Lemon Peel.*—Lemon peel varies much in thickness, its inner portion is white, spongy, and without any

marked odour or taste; but its outer portion is pale yellow when fresh, (although deeper yellow when dried), and more or less rough on the surface in consequence of the abundance of receptacles of volatile oil which are imbedded in the tissue beneath. This outer portion, which was formerly called the *flavedo*, has a strong, peculiar, and fragrant odour; and a warm, aromatic, bitter taste. The fresh outer part of the rind is alone official in the British Pharmacopœia, and is very much to be preferred to dried lemon peel.

Lemon peel contains an abundance of essential oil, which will be presently described (see *Oleum Limonis*), and a bitter principle, of which but little is known, termed *hesperidin*. Some chemists have indicated the presence of a *bitter principle* and *hesperidin*, which they have regarded as a neutral crystalline tasteless substance.

Medical Properties and Uses.—Lemon peel is an aromatic stomachic, and is employed as an adjunct to stomachic infusions and tinctures, partly to increase their efficiency, but more especially as a flavouring agent.

The substance known as *candied lemon peel*, which is employed as a dessert and in confectionery, is also an agreeable stomachic. It is prepared by boiling lemon peel in syrup, and then exposing it to the air till the sugar crystallizes.

2. Oleum Limonis. *Oil of Lemon.—Production.* Oil or essence of lemon may be procured either by expression or distillation, that obtained by the first process being by far the more fragrant and valuable. Nearly all the oil of lemon which reaches this country is imported from Palermo and Messina, and is prepared in Sicily and Calabria. Some oil of lemon is also manufactured at Mentone and Nice in France. As obtained by distillation at Mentone and Nice the surface of fresh lemons is removed by rubbing on a coarse grater of tinned iron, and the grated peel then subjected to distillation with water; it is known as *Essence de Citron distillée*. The best essence of lemon is, however, known as *Essence de Citron au zeste*, and is prepared by scarifying the surface of the peel by rubbing the lemons over a number of sharp pins

placed upright upon a shallow basin of pewter, with the central portion prolonged downwards into a tube closed at its lower end. This vessel is called an *écuelle à piquer*.

The process by expression as now followed in Sicily and Calabria has been thus described by the authors of *Pharmacographia*: "The lemons are used while still rather green and unripe, as being richer in oil than when quite mature. Only the small and irregular fruit, such as is not worth exporting, is employed for affording the essence. The workman first cuts off the peel in three thick longitudinal slices, leaving the central pulp of a three-cornered shape with a little peel at either end. This central pulp he cuts transversely in the middle, throwing it on one side and the pieces of peel on the other. The latter are allowed to remain till the next day and are then treated thus:—the workman seated holds in the palm of his left hand a flattish piece of sponge, wrapping it round his forefinger. With the other he places on the sponge one of the slices of peel, the outer surface downwards, and then presses the zest-side (which is uppermost) so as to give it for the moment a convex instead of a concave form. The vesicles are thus ruptured, and the oil which issues from them is received in the sponge with which they are in contact. Four or five squeezes are all the workman gives to each slice of peel, which done he throws it aside. Though each bit of peel has attached to it a small portion of pulp, the workman continues to avoid pressing the latter. As the sponge gets saturated the workman wrings it forcibly, receiving its contents in a coarse earthen bowl provided with a spout; in this rude vessel, which is capable of holding at least three pints, the oil separates from the watery liquid which accompanies it, and is then decanted. The yield is stated to be vary variable, 400 pints affording 9 to 14 ounces of essence. The prisms of pulp and the exhausted pieces of peel are submitted to pressure in order to extract from them lemon juice, and are said to be also subjected to distillation. The foregoing is termed the *sponge process*; it is also applied to the orange. It appears rude and wasteful, but when honestly performed it yields an excellent product."

General Characters and Composition.—Oil of lemon as prepared, either by the *sponge* or *écuelle* process, is a limpid liquor, having a slight yellow colour, a very fragrant odour like that of the fruit, and a warm, bitterish, aromatic taste. Like the other oils obtained from the genus Citrus, it is dextrogyre. It dissolves but sparingly in rectified spirit, but readily in anhydrous alcohol. It mixes freely with bisulphide of carbon. The *distilled oil* is colourless, far less fragrant, and therefore less valuable as a perfume than the oil prepared as above, and is of less specific gravity. The purified oil of lemon resembles oil of turpentine in composition and general chemical characters. Oil of lemon, as found in commerce, is almost universally mixed with oil of turpentine, or with the cheaper distilled oil.

Medical Properties and Uses.—Oil of lemon is a stimulant and carminative when given internally, and stimulant and rubefacient when applied externally. It has been used as a local application in certain forms of ophthalmia, but with doubtful efficacy. It is chiefly employed in medicine to communicate an agreeable odour and flavour to other medicines. The chief use of oil of lemon is, however, in perfumery, and as a flavouring agent in confectionery.

3. Limonis Succus. *Lemon Juice.*—Concentrated lemon juice is imported in enormous quantities for citric acid manufacturers. As thus imported it is not derived from the lemon only, but also from the lime and bergamot.

General Characters and Composition.—The characters as given in the British Pharmacopœia are as follows :—"A slightly turbid yellowish liquor, possessing a sharp acid taste, and grateful odour. Average specific gravity 1·039. Average quantity of citric acid in one fluid ounce, 32·5 grains." According to Stoddart, however, the specific gravity averages 1·044, and an average of 42·53 grains of citric acid in an ounce of juice. The amount of acid, however, varies in different seasons, diminishing rapidly, as proved by Stoddart, with the advance of summer. Its principal constituents besides citric acid are *gum, sugar,* and, according to Cossa, *potash,* although Stoddart found only a minute proportion of this substance. Lemon juice readily undergoes decomposition,

and should not, therefore, be long kept for use, unless some precautions have been taken for preserving it.

A so-called lemon juice has been manufactured in this country by dissolving tartaric acid in water, then adding a little sulphuric acid, and flavouring with oil of lemon. Such a solution when used as an antiscorbutic, for which purpose it has been supplied, is valueless.

Medical Properties and Uses.—Lemon juice is refrigerant and antiscorbutic, and is exceedingly useful in forming agreeable and refreshing beverages, for allaying thirst, and in febrile and inflammatory complaints. These drinks may be given in the ferm of lemonade, or lemon juice may be added to barley-water. When lemon juice cannot be readily obtained, the best substitute for it is a solution made by dissolving about eight drachms of crystallised citric acid in sixteen ounces of water, and flavouring with a few drops of oil of lemon. Lemon juice may also be used in preparing effervescing diaphoretic and diuretic draughts, which are very valuable vehicles for the exhibition of other remedies and in other ways. The relative proportions required of lemon juice and citric acid, with the alkaline carbonates, for the formation of effervescing draughts, are as follows:

Lemon Juice or	*Citric Acid*	to 20 *grains* of
Fl. drs. iijss .	. grs. xiv	. Bicarbonate of Potash.
Fl. drs. vi . .	. grs. xxiv	. Carbonate of Ammonia.
Fl. drs. iv . .	. grs. xvii	. Bicarbonate of Soda.

Lemon juice is one of the best remedies we possess in scurvy, acting both as a prophylactic and curative agent. On this account, therefore, all ships destined for long voyages should be provided with concentrated lemon juice. But from the difficulty of preserving lemon juice, citric acid is usually substituted for it, although in Dr. Garrod's opinion it is useless, as, according to this author, the antiscorbutic power of lemon juice is due to the potash salts contained in it. Lemon juice is also given as a means of counteracting the effects of narcotic poisons, especially opium. Lemon juice has likewise been strongly recommended

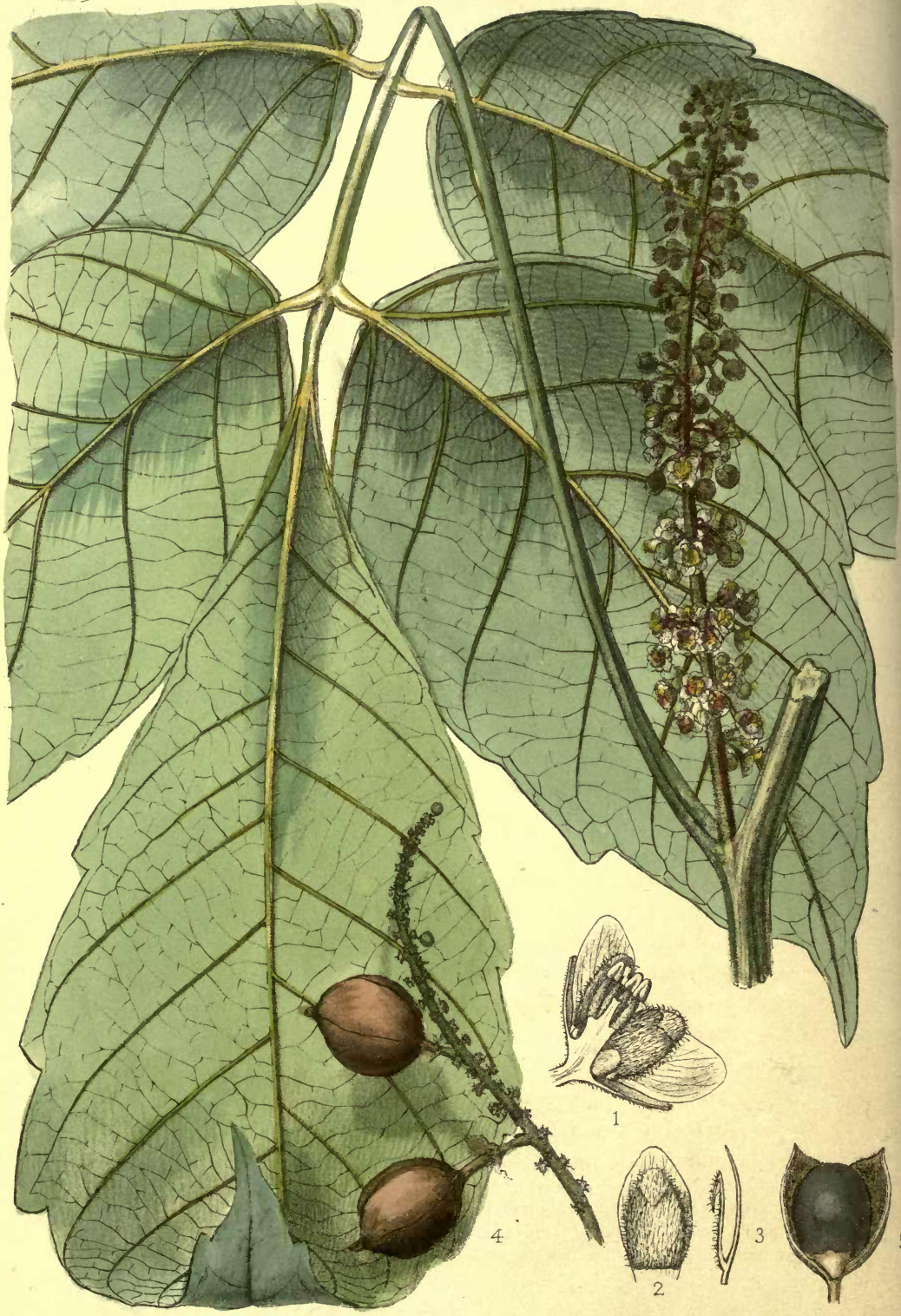
by Dr. Owen Rees as a remedy in acute rheumatism, and has been highly spoken of by many practitioners in this disease, but, according to Garrod, there is "as yet no good clinical evidence proving its value in this disease. Many patients with acute rheumatism recover pretty rapidly when taking lemon juice, but many get well equally soon when taking coloured water."

Per. Mat. Med., by B. & R., pp. 908 and 909; Pharmacographia, pp. 103, 105, and 106; U. S. Disp., by W. & B., pp. 526 and 597; Per. Mat. Med., vol. ii, pt. ii, pp. 536 and 538; Stoddart, Ph. Jl., Oct., 1868, p. 203; Garr., Mat. Med., p. 218.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Botanic Society's Gardens, Regent's Park, with the fruit added.

1. Pistil with the petals and most of the stamens removed.
2. Vertical section of ovary.
3. Transverse section of fruit.
4. Seed.
5. Section of same.



D. Blanc ad. sicc. delt. et lith.

M & N. Hanhart imp.

PAULLINIA SORBILIS, *Mart.*

N. Ord. SAPINDACEÆ. Lindl., Veg. K., p. 382; Le Maout & Dec., p. 351; Baill., Hist., pl. v.

Tribe *Sapindeæ*.

Genus Paullinia, *Linn.** B. & H., Gen. i, p. 394; Baill., l. c., p. 516. Species over 80, natives of tropical America.

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67. Paullinia sorbilis,† *Martius* in *Spix & Mart. Reise in Brasil.*, iii, *p.* 1098 (1831).

Guarana-üva. Guarana.

Figures.—Schnitzlein, Iconographia, iv, t. 230, fig. 1 (from an unpublished figure of Martius); Baill., Hist. Pl., v, fig. 382, 3 (seed).

Description.—A woody climber (?), with an erect angular smooth stem. Leaves alternate, on long stalks, pinnate, with two pairs of leaflets and a terminal one, stipulate, petioles angular, glabrous, leaflets oblong-oval, 5 or 6 inches long by $2\frac{1}{2}$—3 inches broad, rather coriaceous, shortly stalked, the lateral ones rounded at the base, the terminal one tapering, all suddenly contracted into a shortly attenuated blunt point, the margin distantly, coarsely, and irregularly sinuate-dentate, smooth on both surfaces, rather strongly veined beneath. Inflorescence in erect, spicate, narrow panicles, 4 inches or more in length, from the axils of the leaves, pubescent, the flowers shortly stalked in small clusters, laxly arranged on the thick rachis, small. Sepals 5 (or 4) rounded, concave, imbricate. Petals 4, alternate with the sepals, ovate-spathulate, each with a large appendage attached to the upper surface near the base, pubescent on the front, and doubled over in the form of a claw at the apex. Stamens and pistil elevated on the summit of a wide column (gynophore), which projects into the upper part of the flower; in front of this, in the lower part of the flower, are two large, oval, compressed glands, and behind it two much smaller ones. Stamens 8, inserted on

* Named in commemoration of Christ. Fred. Paullini, a German medico-botanical writer, who died in 1712.

† *sorbilis*, potable, from its use as a drink.

both as a remedial agent and for the preparation of a most refreshing as well as nutritive beverage. It is also frequently mixed with articles of diet, as cassava. The beverage is commonly prepared by adding about a teaspoonful of guarana to a glass or cupful of sweetened water; it is said that travellers in Brazil commonly carry it with them, and use it as a substitute for tea.

As a medicine it has been highly recommended in diarrhœa, nervous headache, neuralgia, paralysis, irritation of the urinary passages, and various other affections. But the results obtained by its use in this country are at present very conflicting. It may be administered in substance, or in the form of a beverage as above, or mixed with chocolate, or probably, as alcohol is said to extract all its virtues, the best form of administration would be as an alcoholic extract. It should not be employed in cases where there is a determination of blood to the head, or in plethoric conditions of the bowels.

Martius, in Buchner's Report d. Pharm., xxxi (1829), p. 370; Gavrelle sur une nouvelle Substance Médicinale, Paris, 1829; Mart., Mat. Med. Brazil, p. 59, 1843; Fournier, in Journ. de Pharm., ser. 2, xxxix, p. 291; Hooker's Lond. Jl. Bot. (1851), p. 194; Ritchie, in Monthly Journ. Med. Science, 1852, p. 465; Ph. Jl., vol. xvi, ser. 1, p. 213; U. S. Disp., by W. & B., p. 1670.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum collected by Spruce near the Rio Uaupès, Brazil, in 1852-3 (no. 2055). A leaf and flower-panicle. 1. Vertical section of flower. 2. A petal. 3. Vertical section of the same to show the appendage. 4. Fruit. 5. A fruit with one valve removed to show the seed. This specimen was of somewhat unusual form; the usual shape of the seed is shown in the woodcuts below. (1—3 enlarged.)

4

D Ammoniacum, *Don*.

D. Blair ad. sicc. delt. et lith.

M. & N. Hanhart imp

DOREMA AUCHERI, *Boiss*

N. Ord. UMBELLIFERÆ.

Tribe *Peucedaneæ*.

Genus Dorema, *D. Don.** B. & H., Gen. i, p. 918; Boissier, Fl. Orient., ii, pp. 1008—1010. Species 4, natives of the East.

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129. Dorema Aucheri,† *Boissier in Ann. des Sc. Nat., ser.* iii, *p.* 329 (1844).

Zuh (Kurdish). *Weshek* (Persian).

Syn.—D. Ammoniacum, *Loftus, MS., non D. Don.*

Not previously figured.

Description.—A tall, upright plant, 6—8 feet high. Stem cylindrical, stout, glabrous, solid, faintly striate. Leaves (all radical ?) very large, over 2 feet long, bi- or tripinnate, long-stalked, the petioles and branches nearly cylindrical or sub-triangular, solid, striate, the pinnæ given off in pairs from the upper surface, and projecting upwards and outwards, general outline of leaf when flattened out broadly triangular, the lower pinnæ much the largest, and each pair gradually diminishing in size, leaflets oblong-oval, bluntish or sub-acute at the apex, attenuated and frequently more or less decurrent at the base, rather thin, glabrous or very minutely pilose at the base, entire. Flowers hermaphrodite or male, the two kinds separately arranged in small, simple, globose, stalked umbels; umbels of hermaphrodite flowers very laxly arranged in imperfect whorls or clusters upon long, usually simple, cylindrical, smooth, tapering, spreading branches, 12—18 inches long; umbels of male (barren) flowers more numerously crowded on slender divaricate branchlets, which are arranged in whorls on the thick primary branches. Hermaphrodite flowers; limb of the calyx quite absent, no sign of the teeth being present, petals ovate, thin, with a strongly marked mid-rib, yellow, the

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* *Dorema*, δώρημα, a gift, from the value of its product.

† Aucher-Eloy, the celebrated oriental traveller, died at Ispahan in 1838.

apex elongated, acute, doubled over on the petal; stamens spreading, filaments more than twice as long as the globose anthers. epigynous; ovary inferior, quite smooth, nearly circular on section, the edges of the component carpels somewhat prominent, epigynous disc large, projecting considerably beyond the top of the ovary, conical, lobed at the margin, styles tapering, slightly spreading. Barren flowers: petals considerably smaller, ovary and styles entirely absent, disc smaller, flat, lobed, filaments shorter, anthers as in the hermaphrodite flowers. Fruit $\frac{3}{8}$—$\frac{1}{4}$ inch long, by about $\frac{1}{5}$ wide, on longish divaricate stalks, oblong-oval in outline, brownish or greyish-yellow with pale ribs, styles persistent, reflexed, mericarps much dorsally compressed, pericarp very thin and papery, readily separating from the seed, commissure very nearly flat, dorsal and intermediate primary ribs filiform, faintly marked, lateral ones thickened, forming a narrow sharp border to the mericarp, vittæ quite absent.

D. robustum, Loftus, is referred by Boissier to this species. The fruit (which is all the material in the British Museum) is considerably larger than that of *D. Aucheri*, pale orange-coloured, with more prominent ribs, and without the reflexed style, but is otherwise similar. The gum bears no similarity to Ammoniacum.

Habitat.—This species of *Dorema* appears to have a wide range in the western provinces of Persia and the neighbourhood of Ispahan. Our knowledge of it is mainly from the description of Boissier, but the large series of excellent specimens brought home by Mr. W. K. Loftus, who collected them in 1851-52, has enabled us to considerably supplement Boissier's account. Were it not for the complete absence of vittæ in the commissure the plant of Loftus would fall under *D. glabrum*, F. & M., as the leaves are almost always glabrous, but the character is one of but slight importance, and the species might be, perhaps, combined. The peculiar polygamy of the flowers has been not previously observed in the genus; the great masses of many hundred umbels in the barren inflorescence must give the plant a very characteristic appearance. Loftus gives no information in

his published 'Travels' about this, or indeed about any of the plants he brought back. The plant flowers in June.

Boissier, Fl. Orientalis, ii, p. 1009; Flük. & Hanbury, Pharmacographia, p. 289.

Official Part and Name.—AMMONIACUM; a gum-resinous exudation from Dorema Ammoniacum, *Don.* (B. P.). The gum-resinous exudation from the stem (*Ammoniacum*) (I. P.). AMMONIACUM; a gum-resinous exudation from Dorema Ammoniacum, *Don.* (U.S. P.).

It should be noticed here that the ammoniacum now used in medicine, or *Persian Ammoniacum,* is not the ammoniacum of Hippocrates, Dioscorides, and Pliny, which was employed for fumigation. The latter, which was derived from Africa, and may be distinguished therefore as *African Ammoniacum,* was, according to Lindley, "certainly the produce of *Ferula tingitana.*" This kind of ammoniacum is still collected in Morocco, and forms an object of traffic with Egypt and Arabia, and Dr. Leared has lately obtained some roots of the plant from Morocco, which have been planted in the Botanic Gardens at Kew and Regent's Park, so that it is hoped that its botanical origin, which has been questioned, may be soon conclusively ascertained.

It should be also noticed that the plant now under description is not the recognised botanical source of ammoniacum of either the British, Indian, or United States Pharmacopœia. But that *Dorema Aucheri* does afford very good ammoniacum may be seen by examining the gum-resin yielded by it which is preserved in the British Museum. The tears are in this somewhat smaller, and the surface of the resin darker in colour than in the ordinary lung. As it is not, however, the official plant, our notice of the Collection, Commerce, Composition, General Characters, Medical Properties, and Uses of Ammoniacum, is given under *Dorema Ammoniacum.*

Pharmacographia, p. 289; Per. Mat. Med., vol. ii, pt. ii, p. 184; Hanbury, in Pharm. Journ., March 22, 1873, p. 741; Moss, in Pharm. Journ., March, 1873, pp. 742 and 761.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum, collected by Loftus in Lauristan, Persia.

1. Upper part of a lower (radical?) leaf.
2. Branch of the fertile inflorescence.
3. Hermaphrodite flower.
4. Small portion of the male inflorescence.
5. Male flower.
6. Ripe fruit.
7. A mericarp, dorsal view.
8. The same, commissural surface.
9. Transverse section of fruit.
10. Vertical section of a mericarp.
11. Embryo.
12. *Dorema Ammoniacum*, Don. Whole plant about $\frac{1}{16}$ natural size, reduced from Borczcow's plate (Mem. Acad. Petersb., 1861, t. 3).

(3, 5, 7—10 enlarged; 11 greatly magnified.)

ERRATUM.

129, p. 3, line 7 from bottom, *for* lung *read* drug.

D. Blair ad. viv. delt. et lith.

M&N Hanhart imp

HELLEBORUS NIGER, L.

N. Ord. RANUNCULACEÆ.

Tribe *Helleboreæ*.

Genus Helleborus, *Linn.** B. & H., Gen. i, p. 7; Baill., Hist. Pl., i, p. 79. There are about 12 or 14 species, natives of Europe and Western Asia.

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2. Helleborus niger, *Linn., Sp. Plant., ed.* i, *p.* 558 (1753).

Black Hellebore. Christmas Rose.

Figures.—Woodville, t. 169; Hayne, i, tt. 7, 8; Stephenson & Churchill, t. 11; Nees, t. 393, and Suppl., t. 48; Berg & Schmidt, t. 2 e and f; Bot. Mag., t. 8; Jacq., Fl. Austr., iii, t. 301; Reichenbach, Ic. Fl. Germ., iv, tt. 111, 112.

Description.—A perennial herb with a cylindrical, brownish-black, knotted, brittle, fleshy, subterranean, bracteated, definite rhizome, with its numerous branches much interlaced, and giving off many stout, fibrous, straight, brown roots. Leaves from the extremities of the rhizome-branches on long, cylindrical, tapering, pale green, mottled with red petioles, pedate, the lateral divisions deeply divided into 2—4 nearly separate lobes successively smaller towards the petiole, coriaceous, nearly evergreen, smooth, shining, dark-green above, paler and reticulated beneath, lobes obovate-cuneate, acute or blunt, margin entire below, coarsely serrate above. Flower-stalks terminating the rhizome, surrounded at the base with a loose entire bract, shorter than the leaves, cylindrical, smooth, tapering, mottled with pink below, 1- (rarely 2-) flowered, with 2 or 3 large, ovate, acute, concave bracts a little below the flower. Sepals 5, equal, large, fleshy, roundish-oval, persistent, white with a pink tinge, afterwards becoming greenish, spreading horizontally. Petals 8—13 or more, small, shorter than the stamens, green, tubular, with an oblique bilabiate orifice, the claw filiform. Stamens numerous, hypogynous, inserted on

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* Helleborus, ἑλλέβορος, the classical name. The celebrated plant of antiquity is supposed to have been *H. orientalis*, Lam.

the hollow receptacle in many rows; filaments slender, white. Carpels 5—8, free, elevated on the centre of the receptacle; ovaries ovoid-oblong, smooth; styles long, projecting beyond the stamens; stigmas terminal. Fruit follicular, sessile; pericarp leathery, dehiscing along the ventral suture. Seeds several, in two rows, oval, black, shining; embryo small, at the base of plentiful horny endosperm.

Habitat.—A native of Central and Southern Europe, not reaching Britain or North Germany, but extending eastward to South Poland, and westward to Dauphiny and Provence. From its flowering in midwinter—December to March—it is a favourite in our gardens, where it has been cultivated for centuries, and is found under several varieties, and where its large and handsome flowers are very welcome at a time when there is scarcely anything else in bloom in the open air. The fruit ripens in April and May, and the leaves remain for some months afterwards.

DC. Syst. Veg., i, p. 316; Gren. & Godr., Flore de France; Koch, Synopsis Fl. Germ., ed. 2, p. 21; Lindley, Fl. Medica, p. 6.

Official Part and Name.—HELLEBORUS; the root (U. S. P.). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition. — Black Hellebore is usually imported from Germany. As met with in commerce, it is commonly known as *black hellebore root;* but in reality it consists of two parts,—the rhizome, and the rootlets or roots which spring from it. In commercial black hellebore, the roots are more or less detached from the rhizome, and mixed with it. The rhizome presents a very irregular, knotted, twisted appearance, and occurs in pieces which vary in length from 1 to 2 or 3 inches, and in thickness from about $\frac{1}{4}$ to $\frac{1}{2}$ an inch; it is marked externally with transverse ridges and slight longitudinal furrows. A transverse section exhibits a thick bark, surrounding an internal woody portion (*meditullium*) of a whitish colour, and divided to some

extent into wedge-shaped portions. The roots are numerous, unbranched, cylindrical, about the thickness of a common knitting needle, and usually several inches in length, and when broken across they present a central undivided, or but very slightly stellate, woody axis or meditullium, of a whitish or yellowish-white colour. Both the rhizome and roots have a brownish-black colour; a feeble odour, which has been compared to that of senega root; and a bitterish, slightly acrid taste.

The rhizome and roots of Baneberry (*Actæa spicata*) are frequently substituted for, or mixed with, black hellebore, but the former may be readily distinguished by making a transverse section, or breaking across one of its roots, which will be found to exhibit a meditullium with the woody bundles distinctly arranged in a cruciate, triangular, or more or less radiate manner, according to its thickness, whereas in black hellebore the roots have an entire or but very slightly divided meditullium. Another ready means of distinguishing the spurious drug is by adding to its infusion a solution of a persalt of iron, when it is immediately blackened, owing to the presence of tannic acid. No change is produced in an infusion of black hellebore under the same circumstances, as it contains no tannic acid.

Bastick first discovered a crystalline, non-volatile, neutral principle in black hellebore, having a bitter taste, and also producing a tingling sensation on the tongue. Subsequently, Marmé and Husemann obtained from the leaves and roots of black hellebore, and from similar parts of *Helleborus viridis*, two glucosides, which they called *helleborin* and *helleboreïn*. Both were obtained in crystals; the former being resolvable into sugar, and a peculiar principle which they termed *helleboresin;* and the latter into sugar, and a principle with a fine violet colour called *helleboretin*. Both helleborin and helleboreïn are stated to be poisonous, and the former highly narcotic.

Medical Properties and Uses.—Black hellebore is a drastic hydragogue cathartic, and is also regarded as an emmenagogue and anthelmintic. It was greatly esteemed by the ancients, but at present is but little employed in this country. In the United

States it is chiefly valued as an emmenagogue. It has been employed in mania, melancholia, epilepsy, dropsy, amenorrhœa, dysmenorrhœa, chronic skin affections, worms, and other diseases. In large doses it is a powerful acro-narcotic poison.

Black hellebore is sometimes used, both internally and externally, as a medicine for domestic animals.

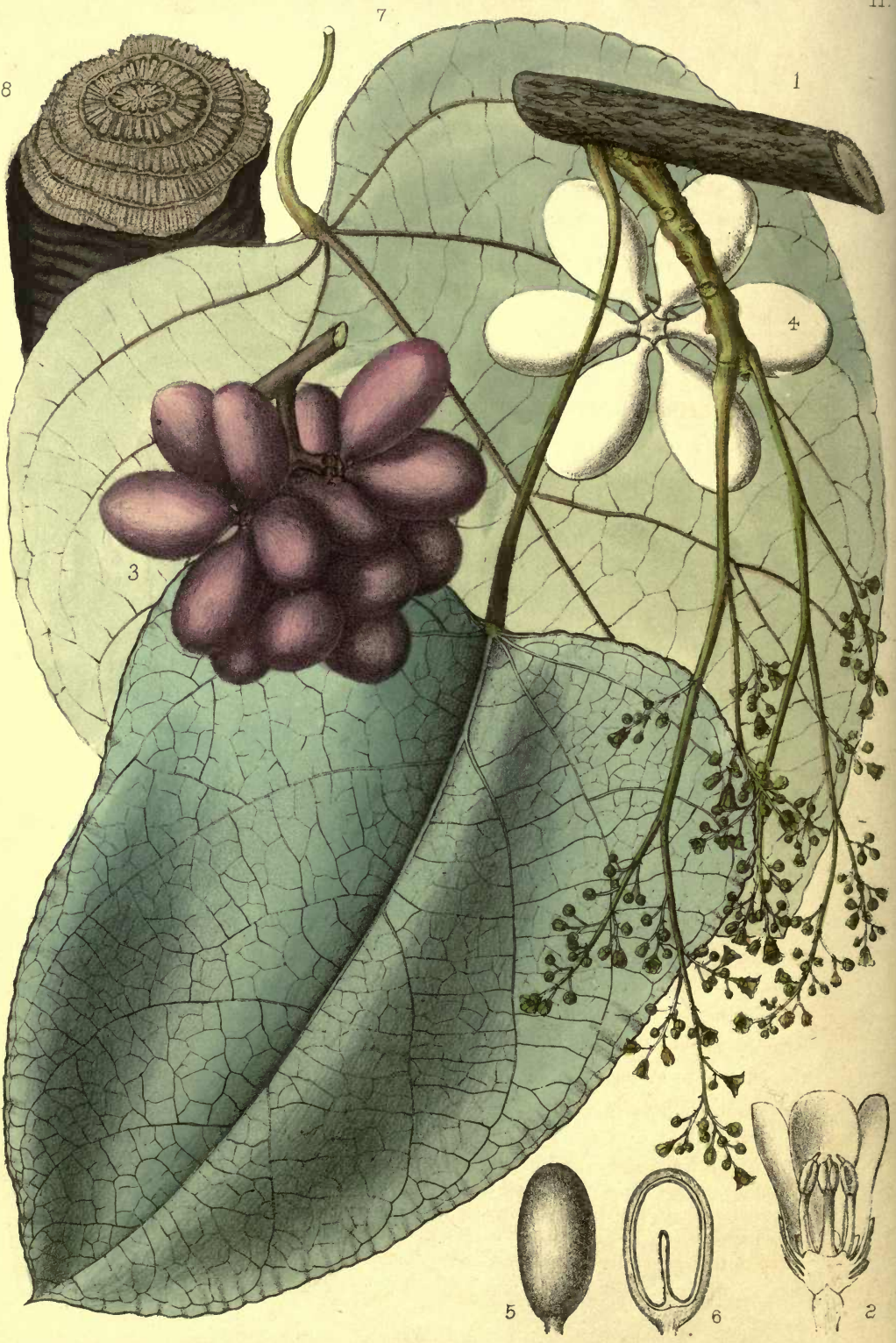
Per. Mat. Med., vol. ii, pt. ii, p. 681; Pharmacographia, p. 2; Per. Mat. Med., by B. & R., p. 994; U. S. Disp., by W. & B., p. 449; Bastick, in Pharm. Journ., vol. xii, 1 ser., p. 274; Bentley, in Pharm. Journ., vol. ii, ser. 2, p. 464, and vol. iii, p. 112; Carson, in Amer. Journ. Pharm., vol. xx, p. 163.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in Messrs. Veitch's Nursery, Chelsea; flowering in January.

1. Vertical section of flower.
2. A petal.
9. Vertical section of the same.

(3 and 4 enlarged.)



D.Blair ad nat. del.t et lith.

M&N Hanhart imp.

CHONDRODENDRON TOMENTOSUM, *Ruiz & Pav.*

N. Ord. MENISPERMACEÆ. Lindl., Veg. K., p. 307; Baill., Hist. Pl., iii; Le Maout & Dec., p. 199.

Tribe *Pachygoneæ*.

Genus Chondrodendron, *Ruiz & Pavon*.* Miers, Contrib. to Bot., iii, p. 307; B. & H., Gen. i, pp. 38 (*Botryopsis*) & 963; Baill., l. c., p. 35. Miers describes eight species, all from tropical America, and some probably varieties of that described below.

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11. Chondrodendron tomentosum, *Ruiz & Pavon, Prod. Fl. Peruv., p.* 132 (1794).

Parreira brava (Old Portuguese). *Butua* or *Abutua* (Brazilian).

Syn.—Cissampelos Abutua, *Vellozo*. Cocculus ? platyphyllus, *A. de St. Hil.* Cocculus Chondodendron, *DC.* Botryopsis platyphylla, *Miers and others.*

Figures.—Vellozo, Fl. Fluminensis, x, t. 140 ?; St. Hilaire, Pl. Usuelles des Brésil., t. 42 (leaves only); Eichler, in Fl. Brasil., fasc. 38, t. 48; D. Hanbury, in Pharm. Journ., 1873, pp. 83, 102 (root and fruit).

Description.—A woody climber of considerable size, the stem reaching over 4 inches in diameter; bark rough, on the smaller branches closely covered with slightly elevated, elongated prominences. Leaves alternate, on very long petioles which are swollen at the ends, and inserted just within the margin of the blade; broadly ovate, with a more or less cordate base, and a blunt or pointed apex, entire, about 5 inches long (in our specimens—said to reach 12 inches), rather thick and coriaceous, smooth and green above, densely covered beneath with a fine, short, greyish tomentum, 5-nerved at the base, but the midrib much the most developed; veins prominent beneath. Flowers unisexual (dicœcious ?), very small, laxly arranged in elongated panicles springing from

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* Name from χόνδρος, a granule, and δένδρον, a tree, from the warty protuberances on the bark. Ruiz and Pavon (accidentally ?) spell the name *Chondodendron*, though giving this derivation. We have followed Miers in restoring what appears to be the correct spelling. The late D. Hanbury preferred to keep to that generally given (see Pharm. Journ., 1874, p. 421).

thick, axillary, leafless branchlets; pedicels shorter than the flowers; bracts minute. Male flowers :—Sepals 6, in two rows, obovate-spathulate, erect, smooth, fleshy, surrounded externally by three whorls of imbricating, ovate, ciliate, externally hairy bracts (also sepals ?), 3 in each whorl, the outer ones the smallest; petals 6, small, scale-like, ovate ; stamens 6, opposite to and connected at the base with the petals, and about four times their length and two thirds the length of the sepals ; filaments broad, connective wide, and prolonged beyond the anther-cells into an obtuse process turned towards the centre of the flower; no trace of pistil. Female flowers (not seen) :—Floral envelopes as in the male ; stamens either wanting or very small and rudimentary ; carpels normally 6, erect, inserted on a short gynophore, smooth, 1-celled, with a single ovule laterally attached; style nearly absent. Fruit composed of 6 (or any less number by abortion), quite distinct, oblong-ovoid, smooth, purplish black drupes, nearly 1 inch long, attached by short stalks to the thickened woody gynophore, from which they spread in a radiating manner; pulp of the drupe scanty, putamen thin, coriaceous, ovoid, with a partition running upwards from the base half way to the top of the cavity. Seed strongly curved, and doubled over the partition, to which it is attached; testa thin, membranous; embryo consisting of two very large cotyledons and a minute radicle; no endosperm.

Habitat.—This plant grows in the neighbourhood of Rio de Janeiro, and in other parts of Brazil, also in Peru, climbing to the summit of high trees in the forests. The Portuguese name, "Parreira brava," signifies "wild vine," and was doubtless bestowed upon the plant from its habit, and the appearance of its bunches of fruit. When the large drupes become fully ripe, and those of different flowers are crowded together, the whole presents much the appearance of a bunch of grapes. Specimens are in cultivation at Kew, but have not yet flowered.

Miers, Contrib. to Bot., iii. p. 311; Eichler, in Mart. Fl. Bras., fasc. 38, p. 199; D. Hanbury, in Pharm. Journ., l. c., pp. 81 & 102.

Official Part and Name.—Pareiræ Radix; the dried root of Cissampelos Pareira, *Linn.* (B. P.). The dried root (*Pareiræ Radix*) (I. P.). Pareira. *Pareira Brava;* the root of Cissampelos Pareira (U. S. P.).

General Characters.—True Pareira Brava—that is, the one derived from *Chondrodendron tomentosum* (the official plant having been proved, by Hanbury, to produce a very different root)—is in long, branched or unbranched, more or less twisted or serpentine pieces, varying in thickness from ½ inch to 2 or more inches; and marked externally with deep, irregular, longitudinal furrows, and numerous transverse elevations and cracks. It is covered by a dark blackish-brown bark, within which the wood, which is of a light yellowish or dull greenish-brown colour, and loose fibrous texture, is arranged in evident concentric, or sometimes eccentric circles, divided into wedge-shaped portions by large medullary rays, and the zones of wood are also separated from one another by a crenated or wavy ring of waxy substance, which is of a pale colour at first, but becomes darker by keeping and exposure to the air. The root presents a coarse fibrous fracture, although when cut it appears of a waxy nature. It has no evident odour, but a well-marked bitter taste.

The stems are sometimes imported and sold as *Pareira Brava.* They may be distinguished by presenting a small, although evident pith, and by their lighter colour externally. In taste they resemble the root, and are probably but little inferior to it.

Substitutes.—The original Pareira Brava had almost disappeared from commerce, until Hanbury called particular attention to this drug in 1873; its place being supplied by spurious roots and stems, and commonly very inferior in medicinal properties to the true root. The principal of these have been described by Hanbury, under the names of White Pareira Brava, from *Abuta rufescens,* Aublet; Yellow Pareira Brava, from, it is presumed, *Abuta amara* of Aublet; and the Common False Pareira Brava, the botanical source of which is unknown, although evidently from a plant of the order Menispermaceæ. It is this spurious drug which has been the ordinary Pareira Brava of commerce for many years

past, and which was supposed to be derived from *Cissampelos Pareira*, L. It may be readily distinguished from the true drug by its lighter brown colour externally, and by cutting tough and fibrous like wood, and not with the close waxy character of the true root. The two drugs may be also readily distinguished by the action of iodine, for whereas a decoction of the spurious Pareira Brava is not coloured blue by iodine, that of the true drug is turned inky-bluish black by tincture of iodine.

Chemical Composition.—In the year 1838, Wiggers discovered in the Common False Pareira Brava, just described, a bitter principle, which he termed *Pelosine*. It is also known as *Cissampeline*. It was afterwards examined by Bödeker, and described as an uncrystallisable alkaloid, insoluble in hot or cold water, but soluble in alcohol and ether, and having a sweetish bitter taste. Subsequently, in 1869, Flückiger, in examining the stem and roots of the *Cissampelos Pareira*, L., obtained from Jamaica, as also the true Pareira Brava from *Chondrodendron tomentosum*, found the same bitter principle, and he pointed out that this body possessed the same chemical properties as the alkaloid *beberia* or *bebeerine* obtained from the bark of *Nectandra Rodiæi* of Schomburgh, and called Bebeeru or Greenheart bark; and also of *Buxine*, obtained by Walz from the bark of *Buxus sempervirens*, L. Flückiger found this bitter principle only in the very small proportion of ½ per cent. The properties of Pareira Brava are commonly said to depend on this alkaloid, but on this point we have no direct evidence. True Pareira Brava also contains starch, and hence its decoction is readily distinguished from that of the Common False Pareira Brava, by tincture of iodine, as already noticed, under the head of Substitutes for Pareira Brava.

Medical Properties and Uses.—Pareira Brava is commonly regarded as a mild tonic and diuretic, exercising apparently an almost specific influence over the mucous membrane of the genito-urinary organs. Sir B. Brodie states that in chronic inflammation of the bladder it is a most valuable medicine, very materially lessening the secretion of the ropy mucus of this disease, and diminishing

also the inflammation and irritability of the bladder. It may be combined with nitric acid or an alkali, according to the state of the urine, and some tincture of henbane may be also added. It has likewise been regarded as a very useful remedy in cystirrhœa, catarrhal affections of the bladder, and chronic pyelitis. Great difference of opinion, however, exists among practitioners as to the value of Pareira Brava, much of which is probably due to the varying character of the drug, but now that the genuine root may be obtained, it is hoped that its merits will be properly tested. It was at one time regarded as a valuable lithontriptic. In Brazil it is employed in the cure of the bites of venomous serpents.

Pharmacographia, p. 25; Per. Mat. Med., vol. ii, pt. 2, p. 672; U. S. Disp., by W. & B., p. 660; Prout, On Stomach and Renal Diseases, p. 392; Flückiger, in Pharm. Journ., vol. xi, 2 ser., p. 192; Brodie, Diseases of the Urinary Organs, 3rd ed., p. 109; Wiggers, Ann. Ch. Pharm., xxviii, p. 29; Hanbury, in Pharm. Journ., vol. iv, 3rd ser., pp. 81 and 102.

DESCRIPTION OF PLATE.

The flowering branch from a specimen in the British Museum, collected in Peru by Pavon; the fruit from a specimen in the Museum of the Pharmaceutical Society, collected near Rio by Mr. Peckolt; the root from a specimen in the Sloane Collection in the British Museum.

1. A flowering male branch.
2. Section of male flower.
3. Portion of a bunch of fruit.
4. Diagram of a fruit with its six drupes developed.
5. A single drupe.
6. Vertical section of the same.
7. Under surface of a leaf.
8. Section of root.

(2 magnified.)

D. Blair ad. sicc. del.t. et lith.

M&N. Hanhart imp.

HÆMATOXYLON CAMPECHIANUM, *L.*

N. Ord. Leguminosæ.

Tribe *Eu-cæsalpineæ*.

Genus Hæmatoxylon, *Linn.** B. & H., Gen., i, p. 567; Baill., Hist. Pl., ii, p. 164. A genus consisting of but a single species.

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86. Hæmatoxylon campechianum, *Linn., Sp. Pl., ed.* 1, *p.* 384 (1753).

Logwood. Peachwood.

Figures.—Woodville, t. 163; Hayne, x, t. 44; Nees, t. 342; Sloane, Hist. Jamaica, t. x, figs. 1–4; Karsten, Fl. Columbiana, t. 114; Tussac, Fl. Antilles, iv, t. 36; Baill., l. c., figs. 49–51.

Description.—A small spreading tree, with very crooked branches covered with a dark rough bark, in the smaller smooth twigs beset with small white dots. Leaves alternate, or apparently fasciculate on stunted branches, pinnate, with 4 (rarely 5) pairs of opposite, shortly stalked, obcordate, smooth, uniform leaflets (rarely bipinnate); stipules small, membranous, usually caducous, but in wild and stunted trees persistent, and forming strong sharp spines. Flowers small, in lax axillary racemes exceeding the leaves, on longish pedicels, which are articulated with the axis; bracts minute. Calyx very deeply divided into 5 broad rounded segments, the anterior one longer than the others, glabrous, purple. Petals 5, forming a nearly regular corolla, spreading, slightly exceeding the calyx-segments, obovate-lanceolate, smooth, yellow, inserted in the mouth of the short cup-shaped tube of the calyx. Stamens 10, inserted with the petals, free, nearly equal, a little longer than the petals, filaments hairy below; anthers small, similar, dehiscing longitudinally. Pistil shortly stalked from the base of the calyx-tube; ovary narrow, compressed, with 2 or 3 ovules; style elongated, filiform, terminated by the small capitate stigma,

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* Name from αἷμα, blood, and ξύλον, wood, in allusion to the colour of the duramen.

projecting beyond the stamens. Pod membranous, lanceolate, compressed, pointed at both ends, 1- or 2-seeded, dehiscent not along the sutures but down the centre of each valve, so as to form two boat-shaped pseudo-valves. Seed transversely oblong, flattened, attached by the centre of its inner border; embryo with two very large cotyledons, each divided into two lobes which are reflected over the sides of the cylindrical radicle; no endosperm.

Habitat.—The Logwood inhabits tropical America, especially the shores of the Gulf of Campeachy (whence it gets its specific name), Honduras, and Columbia. It has become perfectly naturalized in the West Indian islands, having been introduced into Jamaica in 1715, as well as in other tropical countries. Miller successfully cultivated it in England in 1739, and it has since been frequently grown here, and may be seen in most botanical gardens, though it very rarely flowers.

DC., Prod., ii, p. 485; Grisebach, Fl. Br. W. Indies, p. 204; Lindl., Fl. Med., p. 264.

Official Part and Name. — HÆMATOXYLI LIGNUM; the sliced heart-wood (B. P.). The heart-wood (*Hæmatoxyli Lignum, Logwood*) (I. P.). HÆMATOXYLON; the heart-wood (U. S. P.).

Production and Commerce.—The logwood tree is usually felled when about ten years old; the bark and sap-wood (*alburnum*) are then chipped off, after which the red heart-wood (*duramen*) which remains is cut into logs about three feet long, which are alone exported, and constitute the logwood of commerce. Four kinds of logwood are distinguished in the London market, under the names of Campeachy, Honduras, St. Domingo, and Jamaica, which are arranged in the order of their value. The average imports into the United Kingdom in the years 1870, 1871, 1872, and 1873, were about 50,000 tons, representing a money value of above £250,000.

General Characters and Composition.— The logs are dense, tough, and about the specific gravity of 1·057. Externally, by exposure to the air, they acquire a blackish-red colour; internally

they are reddish-brown. For use in pharmacy and in other ways, logwood is found in *chips;* these have a reddish-brown colour, and a slight peculiar agreeable odour, which has been compared to sea-weed, and a sweetish astringent taste. When chewed logwood imparts to the saliva a brilliant dark reddish-pink colour.

Logwood was analysed as far back as 1810 by Chevreul, who found among other substances a *volatile oil, tannic acid,* and a peculiar principle on which the colouring properties of the wood depend, called *hæmatoxylin* or *hématin.* This principle has been since examined by Erdmann and O. Hesse. Hæmatoxylin when quite pure, is colourless or nearly so, and forms white crystals either with one or three equivalents of water; it is very soluble in hot water and alcohol, but only sparingly so in cold water and ether. It has a sweet taste, resembling liquorice. When exposed to the air under the influence of alkalies, hæmatoxylin becomes red. It is sometimes found crystallised in clefts of the wood. The substance known as *hæmatein* is produced from *hæmatoxylin* by extraction of 2 equivalents of hydrogen, a change which takes place by the action of oxygen under the influence of alkalies. Hæmatein occurs in the form of dark violet crystalline scales, which exhibit a fine green hue, an appearance frequently to be noticed on the surface of logwood chips. The decoction of logwood is deep red; acids render it paler and brighter coloured; and the alkalies give it a purplish or violet-blue colour.

Medical Properties and Uses.—Logwood is a mild astringent. When given internally it speedily becomes absorbed, and may be detected in the urine and stools. Its long-continued use has sometimes been followed by phlebitis, hence some caution is necessary in its employment. It has been found useful in chronic diarrhœa and dysentery, in some forms of atonic dyspepsia, and especially in the diarrhœa of infants. As an injection the decoction of logwood has been found of service in leucorrhœa; and in the form of an ointment prepared from the extract of logwood, it is said to be useful in cancer and hospital gangrene.

The principal use of logwood is, however, in dyeing, where it is employed in the production of violet and blue colours, certain

shades of grey, and more especially blacks, to which latter it gives a lustre and velvety cast.

Pharmacographia, p. 187; Garr., Mat. Med., p. 241; Per., Mat. Med., vol. ii, pt. 2, p. 346; Annal. de Chimie, 80 (1812), p. 128; Watts, Dic. Chemistry. vol. iii, pp. 1, 4, and 732; U. S. D., by W. & B., p. 446.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected in Jamaica by Dr. Wright; the fruit added from Hayne.

1. Calyx and pistil.
2. Vertical section of flower.
3. Fruit.
4. The same, showing dehiscence.
5. A leaflet.

D. Blair ad sicc delt. et lith.

M&N Hanhart imp

BRAYERA ANTHELMINTICA, *Kunth*

N. Ord. Rosaceæ.

Tribe *Potericæ*.

Genus Hagenia,* *Gmelin* (1791). B. & H., Gen. i, p. 622 (*Brayera*); Baill., Hist. Pl., i, p. 450 (*Brayera*). A single species only known.

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102. Hagenia abyssinica, *Willd., Sp. Pl.* ii, *p.* 331 (1799).

Kousso, Kusso, Cosso, Koso (Amhara). *Habbe* (Tigre).

Syn.—Banksia abyssinica, *Bruce* (1790). Brayera† anthelmintica, *Kunth* (1823).

Figures.—Berg & Sch., t. 25 f; Bruce, Travels in Nubia and Abyss., tt. 22, 23, cop, in Lam. Encyclop., t. 311; Hook., Kew Journ. Bot., 1850, t. 10; Baill., l. c., figs. 388–392.

Description.—A handsome tree of about 20 feet high or more; branches cylindrical, the younger ones marked with the ring-like scars of the leaf-sheaths, and silky with long upward-pointing yellowish hairs; the growing extremities and young leaves densely golden-silky. Leaves abundant, closely placed, alternate, 10 or 12 inches long when full grown, pinnate with 3 to 6 pairs of opposite leaflets and an odd one, and, usually alternating with these, pairs of very small leaflets; petiole very broadly winged by the adnate stipules, which are dilated at the base to form a broad sheath embracing the stem, and terminate in short blunt ears; larger leaflets ovate- or lanceolate-oblong, 3 or 4 inches long, sessile and unequally rounded at the base, acuminate at the apex, usually overlapping, strongly and rather bluntly serrate, densely silky on both surfaces when young, but becoming glabrous, except on the veins below, and along the margin which remains strongly fringed. Panicles abundant, erect or spreading, from the axils of the leaves, a foot or more long, unisexual, much branched; rachis and branches

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* Named to commemorate Dr. K. G. Hagen, of Königsberg, a German botanist, who died in 1829.

† Named after A. Brayer, a French physician in Constantinople, who wrote a pamphlet upon the plant, published in 1823.

zigzag, more or less densely hairy or pilose and glandular, with a membranous, ovate, veiny, ciliated, often reflexed bract at the base of every branch, the lower ones sometimes leafy. Flowers very numerous, small, shortly stalked, unisexual, each with two rounded membranous veined bracts at its base, greenish-yellow in the male, tinged with red in the female, inflorescence. Male flowers: calyx with a short tube and 10 segments in two whorls; outer whorl of 5 small, linear-oblong, hairy segments, inner of 5 broadly oval, veiny, ciliate, membranous segments twice as long as the outer, usually reflexed, greenish-yellow; petals 5 inconspicuous, alternating with the inner calyx-segments and much shorter than them, linear-lanceolate, acute; stamens about 15—30, inserted with the petals, which they equal in length, in the contracted throat of the calyx, anthers short; carpels 2 undeveloped or abortive. Female flowers: calyx-tube top-shaped, strongly hairy externally, prolonged above into a constricted neck (disk) closely surrounding the styles, segments 10, in two alternating whorls, the outer 5 (epicalyx) broader and longer than the inner even when in flower, persistent and becoming much elongated in fruit, the inner 5 and the petals as in the male flower; stamens very small, shrivelled and sterile, inserted on the exterior of the disk; carpels 2, distinct, arising from the base of the deep calyx-tube which completely encloses the oblong ovaries though free from them; styles about as long as the ovaries, terminal, projecting out of the constricted neck of the calyx-tube; stigma large, flat, horizontal, with prominent papillæ; ovule solitary, suspended from the inner angle of the 1-celled ovary. Fruit a small, indehiscent, ovoid, acute, membranous achene, enclosed in the desiccated calyx-tube, which is crowned, shuttlecock fashion, with the enlarged dry membranous epicalyx, the segments of which are then $\frac{5}{8}$ inch long and oblong in form, and the shrivelled remains of the inner calyx-segments, petals and stamens. Seed solitary, embryo without endosperm, cotyledons plane-convex, radicle small, superior.

The flowers are said to be sometimes 4-merous, the petals to be occasionally wanting, and a third carpel has been observed in a few flowers. The fruit has been rarely collected, and the specimens

we have examined (collected by Ruppell) appear to be not fully matured.

Habitat.—This remarkable tree is confined to Abyssinia, where it appears to be not uncommon in the higher mountainous districts, flowering in October–December; it is also commonly planted near towns and villages throughout the country, and is said to be very ornamental. We are not aware that any attempt has been made to cultivate the Kousso in this country.

In accordance with the universally recognised rules of botanical nomenclature, we have adopted in the text the oldest available published name; *Banksia* had been already given by the younger Linnæus, in 1781, to a New Holland genus of *Proteaceæ*.

DC. Prod., ii, p. 588; A. Richard, Tent. Fl. Abyss., i, p. 258; Hook., Kew Journ. Bot., 1850, p. 349; Oliver, Fl. Trop. Africa, ii, p. 380; Lindl., Fl. Med., p. 230.

Official Parts and Names.—Cusso; the flowers and tops of Brayera anthelmintica, D. C. (B. P.). The dried flowers and tops (*Cusso, Kousso*) (I. P.). Brayera; the flowers and unripe fruit of Brayera anthelmintica (U. S. P. *Secondary.*)

Collection and Commerce.—Kousso is gathered for use in medicine before the seeds are quite ripe. The female flowers are chiefly collected, although not exclusively so; and then suspended in the sun to dry. Kousso is brought from Abyssinia, packed in boxes, and reaches England by way of Aden or Bombay.

General Characters and Composition.—Kousso, Koosso, Kosso, or Koso, by which names as well as some others this substance is known in commerce, occurs in compressed, unbroken or more or less broken, panicles of flowers; or in somewhat cylindrical rolls, with the parts kept together by transverse bands; or sometimes the flowers are found in a separated state. The bunches and rolls vary in length from 10 inches to a foot, or are sometimes even a foot and a half or more. Commercial kousso has a brownish or greenish-brown colour, with a reddish tinge

in the case of the panicles of female flowers. Both kinds of flowers may be distinguishad in commercial kousso, although, as already noticed, the female flowers are more frequently collected. Panicles of the latter, from their red colour, are known as Red Kousso; while the male flowers are termed Kosso-esels. Kousso has a pleasant herby odour, especially when freshly imported, which has been compared by Pereira to the combined odours of tea, hops, and senna leaves. The taste is not very evident at first, but subsequently bitterish, acrid, and disagreeable.

Kousso has been repeatedly examined by chemists, and among its constituents a *volatile oil, bitter acrid resin, tannic acid,* and a bitter principle called *kwoséine, koussin,* or *kosin,* have been found. The nature and characters of koussin have been variously given by chemists. As obtained by Dr. Bedall, of Munich, in 1862, it occurred in a more or less crystalline whitish powder, which was subsequently found to possess the anthelmintic properties of the drug. As afterwards prepared by Dr. E. Merck, of Darmstadt, and described by Flückiger and E. Buri, *koussin* or *kosin* as termed by these chemists, was either in the form of needles, or of short thick prismatic crystals. These crystals were found to vary somewhat in colour, that of the needles being similar to sulphur, of the larger prisms darker yellow, while some fine portions appeared to be white. The specific gravity of kosin was so considerable that it sank in sulphuric acid; it possessed neither smell nor taste; it was almost insoluble in water, and but very slightly so in alcohol, but readily soluble in benzol, bisulphide of carbon, chloroform, and ether. The investigation of Flückiger and Buri lead to the conclusion, at present, that kosin is an ether of isobutyric acid. This kosin, when chemically pure, which is not the case with Bedall's koussin, has been proved by Professor Buchheim, of Giessen, to be very inferior in its anthelmintic action to it; hence it would appear that pure kosin is in itself almost, if not entirely, devoid of action on the animal economy, but becoming medicinally active when combined with some other constituent of the drug.

Medical Properties and Uses.—Kousso is anthelmintic in its

action. It is said to be effectual in destroying both kinds of tapeworm, namely, the *Tænia solium* and *Bothriocephalus latus;* but as it possesses little or no cathartic power, the subsequent administration of a purgative is generally necessary to bring away the destroyed entozoon. In Abyssinia, the drug, which is usually administered in substance in large doses, has sometimes produced alarming and even fatal results; and in this country its use frequently causes nausea, and sometimes vomiting. It should be taken early in the morning fasting; and the last meal of the previous evening should be slight. It is commonly given in this country in the form of the unstrained infusion of the British Pharmacopœia.

Per. Mat. Med., vol. ii, pt. 2, p. 296; Pharmacographia, p. 228; U. S. Disp., by W. & B., p. 178; Pharm. Jl., vol. x, 1st ser., p. 15; Year Book of Pharmacy for 1875, p. 19; Garr., Mat. Med., p. 254; Per. Mat. Med., by B. & R., p. 823; Ph. Jl., vol. v, 3rd ser., p. 562.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum, collected at Dendera, Abyssinia, by Schimper; the fruit added from Berg and Schmidt.

A panicle of male flowers with its subtending leaf.

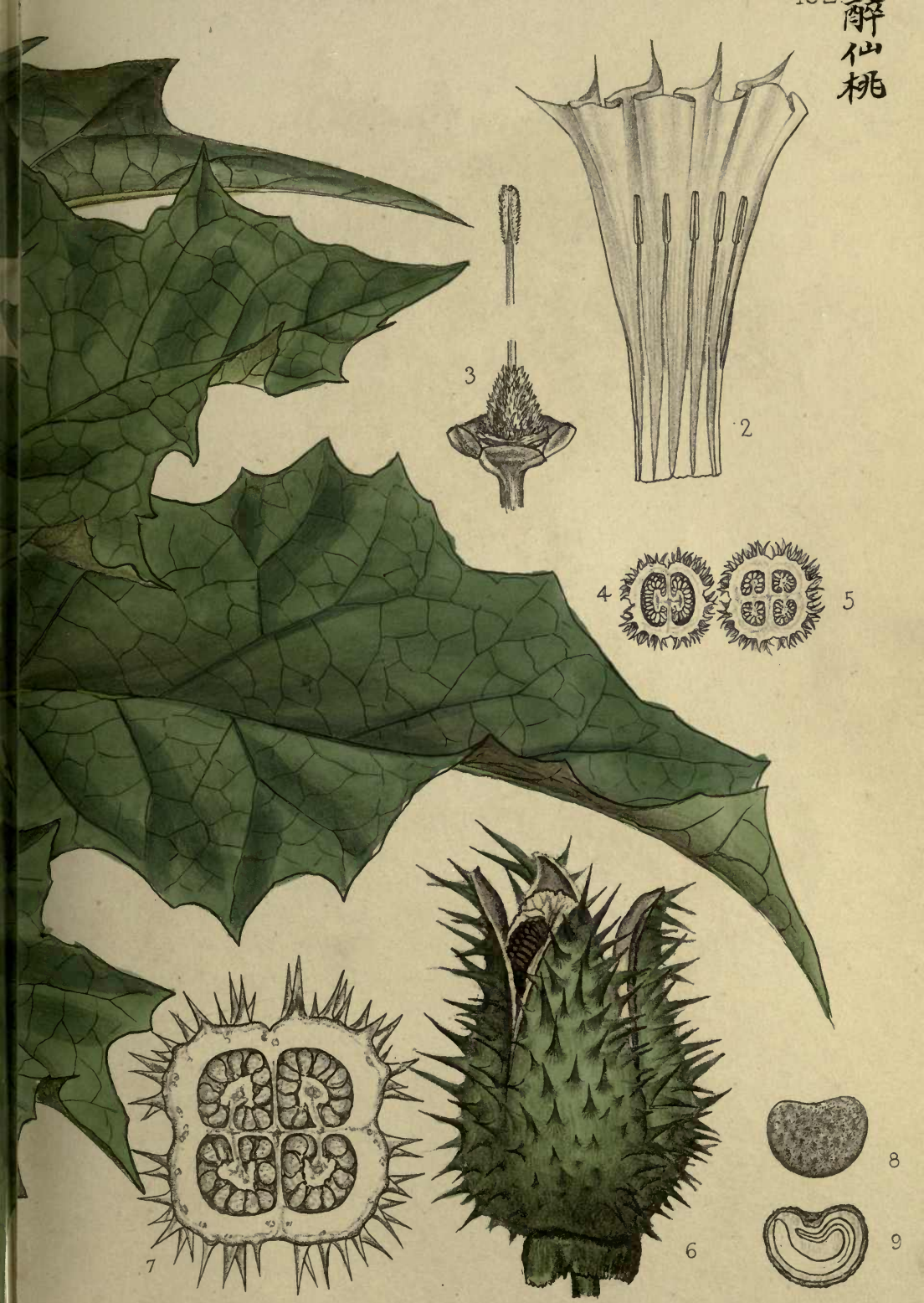
1. A male flower seen from above.
2. A female flower, vertical section.
3. Vertical section of fruit.
4. Achene.
5. Section of the same.

(1, 2, 5 enlarged.)

D. Blair ad nat. del.t et lith.

DATURA S

醉仙桃



M & N Hanhart imp

AMONIUM. *Linn*

N. Ord. SOLANACEÆ.

Tribe *Datureæ*.

Genus Datura,* *Linn.* Dunal in DC. Prod., xiii, sect. 1, pp. 538–546. Species 22, natives chiefly of the tropics in either hemisphere.

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192. Datura Stramonium,† *Linn., Sp. Pl., ed.* 1, *p.* 179 (1753).

Thorn-apple. Stramonium.

Figures.—Woodville, t. 74; Hayne, iv, t. 7; Steph. & Ch., t. 6; Nees, t. 193; Bigelow, t. 1 (*D. Tatula*); Berg & Sch., t. 20 d; Curt., Fl. Lond., fasc. 6; Syme, E. B., vi, t. 935.

Description.—A coarse weedy annual, reaching over 3 feet in height. Root tapering, white. Stem erect, green, thick, succulent, nearly solid, cylindrical, dividing at a short distance from the ground into 2 or 3 very spreading branches, which each again dichotomise more than once, the whole forming a large bushy herb. Leaves placed singly on one side of each bifurcation of the stem, the stout, cylindrical, pale green, tapering petiole appearing to continue the branch and the truly axillary buds remaining but little developed, very unequal in size, the lowest and largest often 8 or 9 inches long, ovate, rather flaccid, the margin undulated and deeply indented with large irregular incisions forming unequal spreading teeth, the base unequal, with one side decurrent along the top of the petiole for a short distance, the apex acuminate, nearly or quite smooth, dull green, paler beneath, the young ones slightly

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* *Datura*, a 16th century name, Latinised from the Persian and Arabic names for *D. fastuosa*.

† *Stramonia*, or *Strammonium*, was the name of *Datura Metel*, L., at Venice in the middle of the 16th century, where it was cultivated; and the plant is figured under that title by Tragus and Fuchsius. The origin of the name is not evident, but may perhaps be an Italianised contraction of the Greek *στρύκνον μανικὸν* used by Dioscorides for *Atropa Belladonna*, and, according to Columna (Phytobasanos, 1592, pp. 46–52), for *D. Stramonium* also, which is beautifully figured (p. 47) by him. *D. Stramonium* seems to have been a later introduction into Europe than *D. Metel;* but as it rapidly spread and became a common plant the name of the latter was transferred to it.

downy. Flowers solitary in the forks (terminal?), shortly stalked. Calyx 1½ inches long or more, pale green, thin, tubular, with 5 short triangular teeth, from each of which a sharp fold or ridge runs down to the base, deciduous, except a small persistent part at the base from which the remainder comes away by a circular fission. Corolla plicate in the bud, tubular-funnel-shaped, 3—4 inches long, and 2 inches wide at the mouth, with 5 plaits and 5 spreading or recurved lobes, with acuminated almost filiform points, white, delicate. Stamens 5, inserted in the corolla-tube and included in it, equal; anthers small, dehiscing longitudinally. Ovary of 2 carpels, pyramidal, 4-lobed, covered with close erect processes, imperfectly 4-celled in the lower part by the outgrowth of a false dissepiment from the dorsal sutures of the carpels to the axile placentas; style about as long as stamens; stigma bilateral, blunt. Fruit about 2 inches long, erect, ovoid, rounded-quadrangular in section, surrounded at the base by the enlarged and reflexed persistent base of the calyx, thickly set with unequal sharp rigid spines, nearly completely 4-celled; pericarp leathery, dehiscing by 4 valves about half way down. Seeds very numerous, closely packed, and flattened horizontally, somewhat kidney-shaped, about $\frac{1}{6}$ inch long; testa very dark brown, with large shallow pits, and also a minute reticulation; embryo much curved and surrounded by endosperm.

Habitat.—The Thorn-apple is considered by De Candolle to be originally from the countries bordering the Caspian. It is now spread throughout the world except in the colder temperate and arctic regions, and is especially abundant in Southern Europe. Its introduction into Central Europe does not appear to have taken place before the middle of the 16th century. It is usually found in rich waste ground, or as a garden weed, and is not unfrequent in the south of England under such conditions, but can scarcely be considered naturalised here. In the United States of America it is a familiar weed.

Whether *D. Tatula*, Linn., is to be considered distinct from the present species is undecided, but the differences are very slight, merely consisting of the purple colour of the stems and

outside of the corolla in *D. Tatula*. Other reasons have led some of the best authorities to keep the species distinct, and De Candolle believes *D. Tatula* to be a native of Central America. It occurs more rarely in England than *D. Stramonium* under similar conditions, and seems a more tender plant; it is very common in the south-west of Europe.

Dunal, l. c., p. 540; Syme, E. B., vi, p. 103; Watson, Comp. Cyb. Br., p. 538; Benth, Handb. Br. Fl., p. 330; Bertoloni, Fl. Ital., vi, p. 606; DC., Geogr. Bot., ii, p. 733; Lindl., Fl. Med., p. 510; Pappe, Fl. Med. Capensis Prodr., p. 30.

Official Parts and Names.—1. STRAMONII FOLIA; the dried leaves: 2. STRAMONII SEMINA; the ripe seeds: (B. P.). 1. The leaves: 2. The seeds: (I. P.). 1. STRAMONII FOLIA; the leaves: 2. STRAMONII SEMEN; the seed: (U. S. P.).

1. STRAMONII FOLIA. *Stramonium Leaves.—Collection and General Characters.* The leaves are directed in the British Pharmacopœia to be collected from plants in flower, cultivated in Britain. In the Pharmacopœia of India they are also directed to be collected when the plant is in flower. In the United States the leaves are generally gathered at any time from the appearance of the flowers till the autumnal frost. When collected the entire plants are usually pulled up, the leaves and young shoots are then separated and quickly dried, and finally these are broken up and cut into short pieces, in which condition they are commonly met with.

The fresh leaves have a fœtid, somewhat narcotic odour, which they lose when dried, and then acquire a faint tea-like smell. The taste of both the fresh and dried leaves is bitterish-saline, and disagreeable.

2. STRAMONII SEMINA. *Stramonium Seeds.*—The characters of these seeds are thus given in the British Pharmacopœia:—"Brownish-black, reniform, flat, rough, in taste feebly bitter and mawkish; inodorous unless bruised, when they emit a peculiar heavy smell." A tincture prepared by digesting the entire seeds in spirit of wine presents a greenish fluorescent appearance. The seeds are much more active than the leaves.

3. SUBSTITUTES.—Of late years the leaves of *Datura Tatula*,

L. a closely allied species, have been used in this country and elsewhere as a substitute for those of *D. Stramonium*, which they closely resemble in properties; but there is no reliable evidence of their being of greater strength, as has been stated.

In the Pharmacopœia of India the leaves and seeds (*Daturæ Folia et Semina*) of *Datura alba*, L., under the name of Dhatura, are also *official*, like the corresponding parts of *D. Stramonium*. They possess similar properties, and are regarded as of about equal strength.

Datura fastuosa, L. another species, or a variety of *D. alba*, and also common in India, has similar properties to it.

Composition.—The activity of both the leaves and seeds of *D. Stramonium* are due to the highly poisonous alkaloid *daturia* or *daturine*; and although we have no chemical proof of the existence of this alkaloid in the other species of *Datura* alluded to under the head of Substitutes, its presence in them can scarcely be doubted. The leaves however, contain the alkaloid in much smaller proportion than the seeds, and the latter even only yield about $\frac{1}{10}$ per cent. The alkaloid is said to be combined with malic acid. This alkaloid was first described by Geiger and Hesse in 1833, but according to A. von Planta, *daturia* is identical in composition, and possesses the same chemical characteristics as *atropia*, which see under *Atropa Belladonna*. The action of the two alkaloids also resemble each other in their power of dilating the pupil of the eye; but, according to Schroff, atropia has twice the poisonous energy of daturia; while Jobert, again, regards daturia, when applied to the eye, as about three times as powerful as atropia, and more constant and lasting in its operation.

Medical Properties and Uses.—The action of stramonium on the system appears to be the same as that of belladonna, and Garrod says, that he made "many comparative clinical observations on stramonium and belladonna and on stramonium and henbane; he could not, however, distinguish between the action of the three plants when they were administered in corresponding doses." Further observations on the action and uses of stramonium are, however, a desideratum. The properties of stramo-

nium are regarded as anodyne and antispasmodic, and in overdoses it is a powerful poison. It has been found useful in neuralgic and rheumatic affections, in gastrodynia and other painful diseases; and some have regarded it as a very valuable remedy in mania and epilepsy; but in these diseases it not unfrequently produces injurious effects. When used during the paroxysms of spasmodic asthma it commonly gives great temporary relief and facilitates expectoration. In the latter disease, and also in dyspnœa, catarrhs, and in other cases, the leaves are generally smoked like tobacco; or inhalation from their infusion in warm water is resorted to. But its use in these ways requires caution, as it has proved highly injurious and in some instances fatal. In Cochin China a strong decoction of the leaves is regarded as a very efficacious remedy in hydrophobia. In India *Datura alba* is frequently used by the natives for criminal purposes,—the professional poisoners from this drug being called *Dhatureeas*.

In the forms of ointment, extract, plaster, fomentation, &c., the leaves and seeds of the different species of *Datura* have been found useful in allaying pain, &c., when applied to painful tumours, rheumatic enlargements of the joints, nodes, external piles, &c. Locally applied to the eye, stramonium produces dilatation of the pupil, and is therefore applicable in similar cases to belladonna, although, in this country at least, it is generally regarded as inferior.

Per. Mat. Med., vol. ii, pt. 1, p. 562; Pharmacographia, pp. 412–416; U. S. Disp., by W. & B., p. 839; Pharm. of India, p. 174; Garr., Mat. Med., p. 328; Amer. Journ. of Pharm., Sept., 1865, p. 341, and vol. xxviii, p. 38; Jobert, Ann. de Therap., 1863, p. 28.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Botanic Society's Garden, Regent's Park. 1. Portion of plant in flower. 2. The corolla laid open. 3. The ovary and stigma. 4, 5. Transverse sections of very young fruit in the upper and lower portions. 6. Ripe fruit. 7. Transverse section of the same. 8. Seed. 9. Section of the same. (3 enlarged; 8 and 9 much magnified.)

M.&N. Herbart imp.

N. Ord. Solanaceæ.

Tribe *Atropeæ*. Miers, Ill. S. Am. Pl., i, App., p. 163, &c. (N. Ord.).

Genus Atropa, *Linn.** Miers, Ill. S. Am. Pl., ii, App., p. 4.

Species 2 or more? natives of South Europe and Asia.

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193. Atropa Belladonna,† *Linn., Sp. Pl., ed.* 1, *p.* 181 (1753).

Dwale. Deadly Nightshade. Belladonna.

Figures.—Woodville, t. 82; Hayne, i, t. 43; Steph. & Ch., t. 1; Nees, t. 191; Berg & Sch., t. 20 c; Curt., Fl. Lond., fasc. 5; Syme, E. B., vi, t. 934; Nees, Gen. Fl. Germ, Gamopet.

Description.—A large, bushy, perennial herb, 3—5 feet high. Root large, fleshy, branched, pale brown. Stems thick, cylindrical, smooth, purplish, at first dividing into three, the branches dichotomous, and frequently branching, the youngest shoots pubescent. Leaves numerous, alternate below, in pairs above, one leaf of the pair much larger than the other, all shortly stalked, 3—9 inches long, broadly ovate or oval, tapering into the petiole, acute, perfectly entire, dark green, veiny. Flowers solitary (rarely 2 or 3 together), coming off from between the pairs of leaves, stalked, drooping; peduncle as long or longer than calyx, with short glandular hairs. Calyx deeply 5-cleft, the segments triangular-acuminate, persistent. Corolla bell-shaped, about an inch long, finely downy outside, cut into 5 broad, shallow, blunt, nearly equal, spreading or slightly recurved lobes, dull reddish-purple, tinged with pale green below. Stamens 5, inserted on the base of the corolla and shorter than it, nearly equal; filaments curved upwards at the end; anthers small, roundish, yellowish-white. Style slightly exserted; stigma capitate, green. Fruit a fleshy berry, sub-globular, depressed, umbilicate at the summit, very obscurely 2-lobed, about ¾ of an

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* Named from Atropos, one of the three Fates, who was fabled to cut the thread of life. (See Linnæus, Hortus Cliffortianus, p. 57.)

† *Belladonna* is stated by Matthiolus and other mediæval botanists to have been the name of this plant in Venice, where it was employed as a cosmetic.

inch in diameter, deep purple-black, smooth, shining, surrounded at base by the enlarged persistent calyx, 2-celled, fruit-stalk erect. Seeds numerous, crowded, lightly attached to the axile placentas, rounded or oval or faintly kidney-shaped, about $\frac{1}{16}$ of an inch in diameter, minutely pitted and reticulated; embryo curved on itself in the endosperm.

Habitat.—This plant grows in waste ground and stony bushy places throughout Central and Southern Europe (not reaching farther north than Denmark), South-West Asia, and Algeria. In England it is found chiefly on chalk and limestone, from Westmoreland southwards, and though abundant in places, it is a local species and perhaps less common now than formerly; from being frequently found near ruins it has been by some writers considered to be introduced to this country. It is cultivated for medicinal use in a few places in France, England, and North America, and has become semi-wild in the latter country. Belladonna is quite unlike any other plant, and the confusion so often made between it and *Solanum Dulcamara* can only be due to both having been called Nightshade. The fruit of Belladonna is about the size, and has somewhat the appearance, of a black cherry, with a slightly sweet taste. The seeds are readily recognisable under a lens from those of other solanaceous plants, and have been not inaptly compared to miniature Sultana raisins.

Dunal, l. c., p. 464; Syme, E. B., vi, p. 100; Hook. f., Stud. Fl., p. 257; Wats., Comp. Cyb. Br., p. 252; Grenier & God., Fl. France, ii, p. 545; Lindley, Fl. Med., p. 509.

Official Parts and Names.—1. Belladonnæ Folia; the fresh leaves, with the branches to which they are attached; also the leaves separated from the branches and carefully dried; gathered from wild or cultivated British plants when the fruit has begun to form: 2. Belladonnæ Radix; the dried root, cultivated in Britain or imported from Germany: 3. Atropia; an alkaloid obtained from Belladonna: (B. P.). 1. The leaves (*Belladonnæ Folia*), gathered when the fruit has begun to form: 2. The dried

root (*Belladonnæ Radix*): (I. P.). 1. Belladonnæ Folia; the leaves: 2. Belladonnæ Radix; the root from plants more than two years old: (U. S. P.).

1. Belladonnæ Folia. *Belladonna Leaves.—Collection and General Characters.* The leaves should be collected, as mentioned in the British Pharmacopœia, when the fruit has begun to form, as they are then in the greatest perfection, for the reasons stated under the head of Collection in *Digitalis purpurea.* The leaves of the wild plant are commonly preferred; but there does not appear to be sufficient reason for this opinion, and Lefort found from the examination of leaves from both wild and cultivated plants, obtained in the neighbourhood of Paris, that they yielded about the same percentage of their active alkaloid.

The fresh leaves and young shoots when bruised, exhale a somewhat fœtid odour, and the expressed juice dropped into the eye dilates the pupil. They have a feeble, bitterish, somewhat acrid taste. According to Squire, 100 lbs. of fresh leaves yield 16 lbs. of dried. The dried leaves have a brownish-green colour above, and are greyish beneath. An infusion dropped into the eye dilates the pupil. They are thin and friable, without any marked odour, but with a disagreeable, faintly bitter, and slightly acrid taste. Belladonna leaves owe their activity entirely to *atropia* (see *Atropia*). In the British and Indian pharmacopœias the fresh leaves with the branches to which they are attached, are directed to be used in the preparation of the extract of Belladonna. The reasons for thus using the branches with the leaves, will be described under *Hyoscyamus niger.*

2. Belladonnæ Radix. *Belladonna Root.—Collection and General Characters.* The root should be collected for drying in the autumn or early spring, and from plants from about two to four years old. It is usually imported from Germany; but if obtained in a fresh state from cultivated plants, and carefully dried, it is more to be depended upon; and roots about the thickness of the middle finger are to be preferred to those of larger size.

The dried root occurs in commerce in rough, irregular, branched

pieces, of from one to two feet long, and from half an inch to two or more inches thick. It has a dirty greyish or brownish-white colour externally, and is whitish internally; it breaks with a short fracture. It has a very faint, earthy, somewhat sickly odour, and a feeble sweetish taste. An infusion dropped into the eye dilates the pupil. Belladonna root owes its activity, like the leaves, entirely to the alkaloid *atropia*, but this is present in the root in much larger proportion (see *Atropia*).

An uncrystallizable alkaloid, called *belladonnine*, has also been indicated by Hübschmann as a constituent of belladonna root, but of this little is known. The herb also contains *asparagine*, and Attfield obtained from the extract of the leaves both *nitrate* and *chloride of potassium*, and some other substances.

3. Atropia or Atropine.—As already stated, it is to the presence of this alkaloid that the leaves, root, and herb generally, of belladonna, owe their active properties. We have also noticed when treating of Datura Stramonium, that the alkaloid *daturia* is said to be identical in composition, and to possess the same characters and properties, as *atropia*. Atropia is however, contained in by far the larger proportion in the root, which is exclusively used in order to obtain it, and as the alkaloid is principally contained in the bark, the moderately young and small roots yield more atropia than the old and thick roots. According to Brandes, two pounds of the root should yield about forty grains of atropia. It is found in combination with malic acid. Atropia occurs in colourless acicular prisms, sparingly soluble in water, and freely soluble in alcohol, ether, and chloroform; its solution in water has an alkaline reaction, gives a citron-yellow precipitate with terchloride of gold, and has a bitter taste. Atropia leaves no ash when burned with free access of air; powerfully dilates the pupil of the eye; and is a very active poison.

Medical Properties and Uses.—The action of belladonna leaves and root, as already stated under the head of *Datura Stramonium*, appears to be exactly the same as stramonium. Belladonna is regarded as anodyne, sedative, antispasmodic, diuretic, and lactifuge; and like stramonium and some other plants of the natural

order to which it belongs, it dilates the pupil of the eye, whether taken internally, or applied locally. In large doses, belladonna is a powerful poison. It has been used internally in a great variety of diseases, as chorea, epilepsy, hooping-cough, asthma, &c.; also to allay pain and spasm in various forms of neuralgia, rheumatism, gastrodynia, spasmodic stricture of the urethra, colic, tetanus, delirium tremens, dysmenorrhœa and other painful uterine affections; also to check incontinence of urine in children, &c.; as an antidote in poisoning by opium, hydrocyanic acid, or the calabar bean; and in diabetes, pneumonia, acute nephritis, chronic albuminuria, exophthalmic goitre, and numerous other affections. Dr. John Harley also regards it as a most valuable remedy in scarlatina. It has also been considered as a prophylactic against scarlatina, more especially by homœopathic practitioners, but the more general experience of physicians is entirely opposed to this idea.

Atropia is but little used for internal administration on account of its very powerful action. Both it and the sulphate of atropia in solution may be, however, employed for subcutaneous injection. The solution of sulphate of atropia is frequently used in this way, in the collapse of cholera, and in that of digitalis, colchicum, and aconite poisoning, &c.; and also by ophthalmic surgeons for dilating the pupil of the eye.

Both belladonna and atropia are likewise valuable applications to give relief in various neuralgic, rheumatic, and other painful affections, as angina pectoris and palpitation of the heart. Belladonna when applied to the female breast checks the secretion of milk; and Dr. Ringer has found it very useful in checking sweating, as that of the head in rickets; and he also found that the hypodermic injection of $\frac{1}{200}$ gr. of atropia arrested sweating for a whole night in a case of phthisis. The local application of belladonna also moderates inflammatory action, and has thus been found to check suppuration in carbuncles, &c. Belladonna and atropia are also of great value to the ophthalmic surgeon to produce dilatation of the pupil of the eye for ophthalmoscopic examination; and in cataract and other eye affections where it is desirable to dilate the pupil, or

to keep the edge of the iris free, and also to diminish the morbid sensibility of this organ to the influence of light.

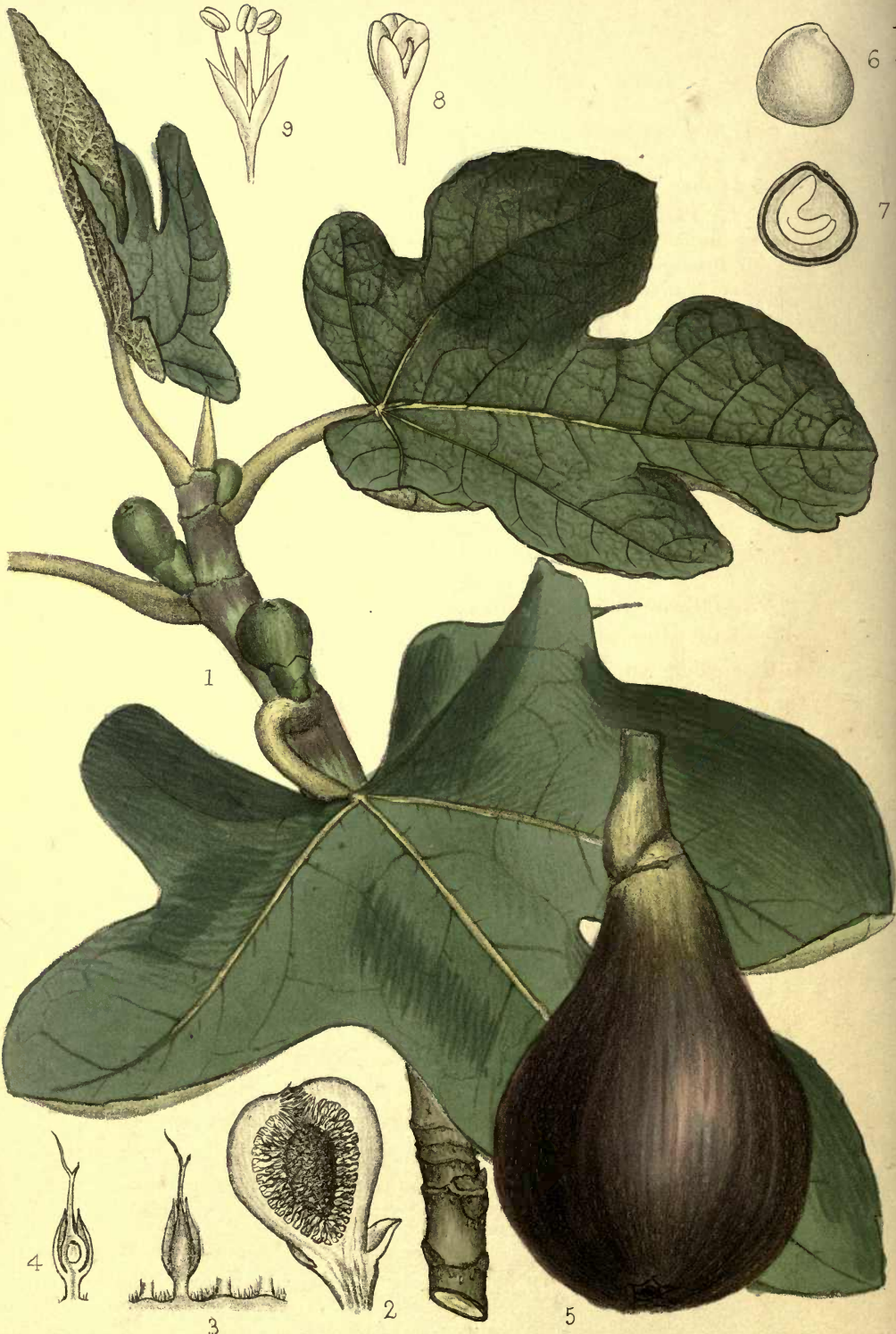
Per. Mat. Med., by B. & R., p. 602; Pharmacographia, pp. 409 and 411; U. S. Disp., by W. & B., p. 169; Garr. Mat. Med., p. 324; Royle's Mat. Med., by J. Harley, p. 493. Amer. Journ. of Pharm., vol. xiii, p. 127, and vol. xxxiv, p. 126; Attfield, in Pharm. Journ., vol. iii, 2 ser., p. 448; Squire, in Pharm. Journ., vol. iii, 2 ser., pp. 300 and 368; Bentley, in Pharm. Journ., vol. i, 2 ser., p. 515, and vol. iii, p. 475; Lefort, in Journ. de Pharm., vol. xv (1872), pp. 269 and 341; Dr. T. T. Smith, in Lancet (1874).

DESCRIPTION OF PLATE.

Drawn from a plant in the Royal Botanic Society's Garden, Regent's Park.

1. Reduced sketch of the rootstock and a flowering stem.
2. A branch with flowers.
3. Corolla laid open, and pistil.
4. Vertical, and—5. Transverse section of ovary.
6. Fruit.
7. Transverse section of the same.
8. Seed.
9. Section of the same.

(3–5 enlarged; 8, 9 greatly magnified.)



D. Blair ad nat. delt. et lith.

M & N Hanhart imp.

FICUS CARICA, *Linn.*

N. Ord. ARTOCARPACEÆ. Le Maout & Dec., p. 669; Bureau in DC. Prod., xvi, p. 280.

Tribe *Ficeæ*. Lindl., Veg. K., p. 266.

Genus Ficus, *Linn.** A vast genus not as yet fully monographed. Estimated to contain over 600 species (including *Urostigma*, &c.), found in the warmer and tropical parts of both hemispheres.

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228. Ficus Carica,† *Linn., Sp. Plant, ed.* 1, *p.* 1059 (1753).

Fig.

Syn.—Ficus ssp. and Caprificus, *Gasparrini.*

Figures.—Woodv., t. 244; Hayne, ix, t. 13; Steph. & Ch., t. 154; Nees, t. 97; Berg & Sch., t. 19 a; Reichenb., Ic. Fl. Germ., xii, t. 659; Nees, Gen. Fl. Germ., Apet.

Description.—A small, irregularly-branched tree, or large straggling bush; branches numerous, cylindrical, with a smooth reddish or pale grey bark, marked, whilst young, with the scars of the petioles and fallen stipules; the youngest twigs downy. Leaves alternate, deciduous, spreading, on longish, thick, often curved, cylindrical, downy petioles; blade 4 or more inches long, rather rigid, dark green, rough on the upper surface, finely woolly beneath, sub-cordate at the base, usually more or less deeply cut into 3 or 5 palmate, broad, rather blunt lobes, margin more or less irregularly and coarsely dentate-serrate; stipules large, smooth, early deciduous, embracing the whole circumference of the stem and enveloping the young bud like an extinguisher. Flowers unisexual, minute, closely crowded on the inner surface of a large, hollow, externally pear-shaped receptacle, supported at the base by several broad, smooth, scaly bracts, and perforated at the apex by an orifice closed by numerous small scales; these receptacles are axillary and supported on short stalks. Male flowers (not seen) few, found near the mouth of the receptacle, "perianth-segments 3—5, stamens 1—5, generally 3, filaments longer than perianth"

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* *Ficus*, the Latin classical name; in Greek, *συκῆ* or *συκέα*.

† *Carica*, used by the Latin authors for a dried fig; from Caria in Asia Minor, where they were produced.

and inserted at its base. Female flowers occupying the whole, or all but the uppermost part of the receptacle, shortly stalked, perianth very delicate and transparent, deeply cut into 3—5 acute segments; ovary superior, hyaline, 1-celled (rarely 2-celled?), with a single ovule, style lateral, tapering, much exceeding the perianth and cut into two tapering, usually unequal, stigmas. "Fruit" varying in size to nearly 3 inches long, smooth, yellowish stained with purple, shining, consisting of the pear-shaped receptacle, which has become enlarged, soft, and fleshy, with very numerous minute seed-like nuts (true fruit) crowded over its inner surface, surrounded by the remains of the perianths. Nut 1-celled, pericarp yellow, brittle; seed solitary, suspended, embryo strongly curved lying in a fleshy endosperm.

Habitat.—The Fig tree is native in Syria and some adjacent parts of Asia Minor, extending, in a wild state, perhaps to the north-west confines of India, but, as in the case of universally cultivated plants generally, it is not easy to distinguish the truly wild area. It was very early introduced into the Mediterranean countries of Europe and spread with civilisation over the whole of that continent; it is now found in cultivation in all the temperate and warmer countries of both hemispheres. It ripens its fruit well in England in warm seasons. The form of the leaves is very variable, some trees having them cordate-ovate, or faintly three-lobed; whilst, on the other hand, there are forms with small, deeply-cut, sub-pinnatifid leaves; the size and amount of hairiness also varies considerably. The fruit is sometimes green or white, even when fully ripe. On the varieties of the wild and cultivated fig, reference must be made to Gasparrini's papers quoted below, where they are considered as several species under two genera (*Ficus* and *Caprificus*). It is remarkable that the nuts in many kinds of fig are found to be empty (no embryo being developed), although the "fruit" has thoroughly ripened. The male flowers are rarely found. and, it is said, only in those receptacles which are produced early in the lowest axils.

Gasparrini, Nova Genera (1844), and Ricerche sulla natura del Caprifico (1845); Parlatore, Fl. Ital.; Brandis, Forest Fl. Ind., p. 418; Lindl., Fl. Med., p. 487.

Official Part and Name.—Ficus; the dried fruit (B. P.). The dried fruit (*Ficus*) (I. P.). The dried fruit (U. S. P.).

General Characters and Commerce.—The fruit of the fig is called a *syconus*. A fig consists of a fleshy, hollow, pear-shaped receptacle, provided with a small orifice at its apex, and bearing upon its inner surface numerous small seed-like fruits, termed *achenia*. In the unripe state the receptacle is green and tough, and contains an acrid, somewhat bitter, milky juice; but as it ripens, the receptacle enlarges, becomes softer and more juicy, the acrid milky sap is replaced by a saccharine fluid, and it assumes commonly a purple hue externally, although sometimes a brown or yellow colour, or even remains green.

On a small scale and in favorable climates figs may be dried on the tree, but for commercial purposes they are always gathered and dried either in ovens, or more commonly by exposure to the sun. When dried, they are either rendered pliant by squeezing and kneading, and are then packed by pressing into drums and boxes, in which state they are called *pulled figs;* or they are packed in the state in which they are left after having been dried, when they are termed *natural.*

The largest and best figs come from Smyrna, and are known as *Smyrna* or *Turkey Figs;* smaller and less pulpy figs are likewise imported under the name of *Greek Figs.* The best Smyrna figs are also termed "Eleme Figs." The total imports of figs of all kinds into this country average about 150,000 cwt. annually, representing a money value of about £240,000. Of these about 100,000 cwt. come from Asiatic Turkey, and the remainder from Spain, Portugal, and other countries.

The official Smyrna figs are of an irregular compressed form; soft, tough, more or less translucent, of a brownish or yellowish colour externally, and covered, in cool weather, with a saccharine efflorescence. They have an agreeable, peculiar, fruity smell; and a very pleasant sweet taste.

Composition.—The principal constituent of figs is *grape sugar,* which forms from 60 to 70 per cent. of the dried fruit. It is this sugar which constitutes the efflorescence seen on figs in cool

weather. Figs also contain a small quantity of *gum, fatty matter,* and some other unimportant substances.

Medical Properties and Uses.—Figs are regarded as nutritive, emollient, demulcent, and laxative. They are, however, rarely employed medicinally; but persons subject to habitual constipation sometimes find them useful as an article of diet. Roasted or boiled, and split open, they are occasionally used as a suppurative poultice in gum-boils.

In countries where they are plentiful figs are taken as food, and are regarded as agreeable and wholesome; but in this country they are chiefly employed as a dessert.

Isaiah xxxviii, 21; 1 Sam. xxv, 18; 1 Chron. xii, 40.

Per. Mat. Med., vol. ii, pt. 1, p. 379; Pharmacographia, p. 488; U. S. Disp., by W. & B., p. 407.

DESCRIPTION OF PLATE.

Drawn from a tree in the Royal Botanic Society's Garden, Regent's Park; the male flowers added from Nees, the embryo from Berg and Schmidt.

1. A flowering branch.
2. Section of the inflorescence.
3. A female flower.
4. Section of the same.
5. Ripe "fruit."
6. A nut.
7. Section of the same.
8, 9. Male flowers.

(2–4, 8, 9 enlarged; 6, 7 greatly magnified.

D.Blair ad sicc. del. et lith

M&N.Hanhart imp

ANAMIRTA PANICULATA, *Colebr.*

N. Ord. MENISPERMACEÆ.

Tribe *Heteroclinieæ*.

Genus Anamirta,* *Colebrooke*. B. & H. Gen., i, p. 35; Baill., Hist. Pl., iii, p. 40; Miers, Contrib., iii, p. 49. Species 7 (Miers), natives of India and the Malayan Islands.

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14. Anamirta paniculata, *Colebrooke, in Trans. Linn. Soc. Lond.*, xiii, *p.* 66 (1822).

"Cocculus† indicus."

Syn.—Menispermum Cocculus, *Linn.* (in part). M. heteroclitum, *Roxb.*; Anamirta Cocculus, *Wight & Arn.* Cocculus suberosus, *DC.*

Figures.—Nees, tt. 365, 366; Berg & Sch., t. 14 a (fruit); Rheede, Hort. Malab., vii, t. 1; Ann. des Sc. Naturelles, ser. 2, ii, t. 3; Miers, l. c., t. 97 (fruit).

Description.—A large woody twiner, with thick branches; bark deeply corrugated, corky, grey. Leaves alternate, on long stalks, which are thickened at both ends and prehensile, blade subcoriaceous, varying from 4 to 8 inches long, ovate or cordate-ovate, acute, smooth and pale green above, whitish below with tufts of hair in the axils of the prominent veins, margin nearly entire. Flowers small, dicœcious, arranged in pendulous compound racemes 8 to 12 or more inches long, springing from the old wood, on short, thick, divaricated pedicles, rachis smooth. Male flowers: sepals 6 imbricate, surrounded at the base with 2 or 3 small bracts, ovate, thin, spreading; petals none; stamens numerous, closely crowded on a shortly stalked globose receptacle, so as to form a round mass in the centre of the flower, filaments almost absent, anthers 4-celled. Female flowers: sepals as in the male; petals none; stamens represented by a hypogynous ring of 10 very small bifid fleshy staminodes united below; carpels 5, rarely 4 (or 3 ?), supported on a short gynophore, which divides

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* *Anamirta*, taken "from an Indian term contrasting it with a name of a common *Menispermum*."

† *Cocculus*, the mediæval name for these fruits; from the Italian *coccola*, a small berry.

above into short thick branches, erect, flask-shaped, gibbous below, smooth, 1-celled; stigmas terminal, triangular, reflexed. Fruit of 1–5, usually 2, rounded-ovoid drupes about ½ inch long, with the remains of the stigma on the inner side, each obliquely supported on a short strong branch springing from the summit of the gynophore, which has become a hard woody stalk ¼ inch long; pulp very scanty, endocarp thin, brittle, indehiscent, penetrating deeply on the ventral side, so as to form a hollow space in the fruit, and reflexed so as to divide this into two cavities. Seed reniform on section from the intrusion of the endocarp, embryo large, curved, with two narrowly lanceolate widely separated cotyledons lying in the centre of abundant endosperm.

Habitat.—This climbing shrub grows commonly on the eastern side of the Indian Peninsula; also in Ceylon and some of the Malayan Islands, unless the plants from these parts are to be referred, as is done by Mr. Miers, to different species. There are specimens in the gardens at Kew, Chelsea, and the Regent's Park, but they have not flowered.

Miers, Contrib. Bot., iii, p. 51; Hook. f., Fl. Brit. Ind., i, p. 185; Lindl., Fl. Med., p. 371.

Official Part and Name.—Cocculus Indicus; the fruit dried of Anamirta Cocculus, *W. et. A.* (I. P.). Not official in either the British Pharmacopœia, or the Pharmacopœia of the United States.

Commerce.—Cocculus Indicus is imported from Bombay and Madras. It was formerly brought to Europe by way of the Levant, and hence the names of *Levant nut* and *Levant shell,* by which it used to be designated. The amount consumed in this country is not accurately known, but the average imports annually are probably not less than 50,000 lbs.

General Characters and Composition.—As met with in commerce, the dried fruit, which is commonly known as *Cocculus Indicus,* is somewhat kidney-shaped, and generally less than ½ an inch in length, or about the size of a small hazel nut. It is covered externally by a thin, blackish-brown, wrinkled skin,

which covers a whitish, thin, woody shell or endocarp. On one side of the fruit this shell doubles inwards, and forms a projection, which is contracted at the base, but enlarged and divided above into two branches; and upon this projection there is placed a solitary, oily, yellowish-white seed, of a reniform or somewhat semilunar shape. In a vertical section of the fruit this seed is seen not to fill the shell, as it contracts in drying, and by keeping it becomes more and more shrivelled and wasted, so that in old samples of cocculus indicus the shell is frequently found almost empty. The test of the goodness of cocculus indicus formerly given in the Edinburgh Pharmacopœia, was, that "the kernels should fill at least two thirds of the fruit." Cocculus indicus has no odour, and the shell is almost tasteless, but the seed is very bitter.

Cocculus indicus has been sometimes confounded with the fruit of *Laurus nobilis*, which is commonly known as the Bay berry. The latter is, however, generally larger, distinctly oval in form, and its contained seed lies loose in, and fills the cavity of, the fruit. The seed of the bay berry has also an agreeable aromatic odour, a firm consistence, and is readily separated into two equal portions.

The pericarp of cocculus indicus contains two isomeric, tasteless, crystallisable alkaloids, termed *menispermia* and *paramenispermia*, combined with an acid called *hypopicrotoxic acid*. Of these substances but little is known. The properties of cocculus indicus are entirely due to the presence of a white, crystalline, non-nitrogenised, intensely bitter, very poisonous, neutral principle, termed *picrotoxin*, which is only contained in the seed. Picrotoxin is soluble in water and in alkaline solutions. An aqueous solution is not affected by tannic acid, or by any metallic salt, hence picrotoxin may be readily distinguished from the bitter poisonous alkaloids.

Medical Properties and Uses.—Both cocculus indicus and picrotoxin are poisonous. They are never administered internally, but are occasionally employed externally in the form of an ointment (made by incorporating about eighty grains of the seeds, or ten

grains of picrotoxin, with one ounce of prepared lard), as an insecticide, to destroy pediculi, &c., and in some obstinate forms of chronic skin disease. Its use, however, requires great caution, and more especially so when the skin is abraded.

Cocculus indicus and picrotoxin act as intoxicating agents, and hence the former is used for taking fish, which it stupefies, and for adulterating beer and ale. For the latter purpose especially it is said to be largely employed by publicans, to impart a bitter taste to the malt liquors and to increase their intoxicating effects, but it must be admitted that we have no very satisfactory evidence on this point, for but very few cases are on record in which cocculus indicus has been detected by chemists in malt liquors; although recently a correspondent in the 'Pharmaceutical Journal' has found cocculus indicus in some port wine lees.

Per. Mat. Med., vol. ii, pt. 2, p. 667; Pharmacographia, p. 30; U. S. Disp., by W. & B., p. 1573; Gerarde's Herbal, by Johnson, 1636, p. 1549; Bentley, Man. Bot., p. 411; Pharm. Journ., vol. xv, 1st ser., p. 407, and vol. vi, 3rd ser., p. 540.

DESCRIPTION OF PLATE.

The male flowers and foliage drawn from a specimen in the British Museum from the Calcutta Botanic Garden (Wallich); the female flowers and fruit from specimens in the same herbarium, collected by Thwaites in Ceylon (no. 2722 = *A. toxifera*, Miers).

1. Leaves.
2. Panicle of female inflorescence.
3. A female flower.
4. The same, with the sepals removed.
5. The same, with the carpels also removed to show the ring of abortive stamens and gynophore.
6. A male flower.
7. Section of an anther.
8. Fruit.
9. A single drupe, ventral surface.
10. Vertical, and—11. Transverse section of the same.

(3–7 enlarged.)

D.Blair ad sicc. del et lith.

M&N.Hanhart. imp

CANELLA ALBA, *Murr.*

N. Ord. CANELLACEÆ. Lindl., Veg. K., p. 442; Baill., Hist. Pl. i (under *Magnoliaceæ*); Le Maout & Dec., p. 243.

Genus Canella,* *P. Browne.* B. & H. Gen., i, p. 121; Baill., l. c.. p. 185; Miers, Contrib. Bot., i, p. 112. Species 2, natives of the W. Indies, Florida, and Columbia.

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26. Canella alba, *Murray, Linn. Syst. Veg., ed.* 14, iv, *p.* 443 (1784).

White Wood. Wild Cinnamon (Jamaica).

Syn.—Winterania Canella, *Linn.* Canella Winterana, *Gaertn.*

Figures.—Trans. Linn. Soc. Lond., i, t. 8, cop. in Woodv., t. 237, Hayne, ix, t. 51, and Steph. & Ch., t. 66; Nees, t. 418; Baill., l. c., figs. 211–215; Miers, l. c., t. 23 A (seed).

Description.—An evergreen tree, reaching 30 or 40 feet in height, and much branched above, with a silver-grey bark on the young branches. Leaves numerous, alternate, without stipules, shortly stalked, 2—5 inches long, oblong-ovate, blunt at the apex, tapering at the base, quite entire, thick, smooth, shining above, paler below, the younger ones with immersed pellucid glands. Inflorescence consisting of small, much branched, terminal corymbs, shorter than the leaves, the pedicels about as long as the flowers, $\frac{1}{6}$ inch, or a little more. Sepals 3, rounded, coriaceous, short, persistent, strongly imbricated. Petals 5, two or three times as long as the sepals, oblong, erect, fleshy, blunt, imbricated, the 2 innermost narrower, pale violet-coloured. Stamens hypogynous, monadelphous, combined into a rather fleshy tube a little shorter than the petals, anthers apparently 10, forming a ring of 20 closely placed equal linear cells adnate to the outer surface of the tube, extrorse, tube prolonged a little beyond the anther-cells, margin entire. Pistil flask-shaped, sessile, smooth, pellucid-punctate with immersed glands; style short, thick; stigma faintly bilobed at about the level of the top of the staminal tube; ovary 1-celled, with 4 reniform ovules attached in pairs to 2 opposite parietal

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* *Canella,* from *canela,* the Spanish word for cinnamon.

placentas. Fruit a berry, about ½ inch long, rounded-ovoid, fleshy, when ripe blue-black, glossy, supported at base by the persistent calyx, shortly pointed at apex. Seeds 2 to 4, immersed in mucilage, somewhat irregular in form, roundish-reniform or angular from pressure, testa black, shining, brittle, hilum minute, inner coat membranous, thick; embryo small, very excentric, curved, lying at the upper end of a copious fleshy endosperm, radicle thick, near the hilum.

Habitat.—This is a native of the wooded hills of Jamaica, Cuba, and other of the West Indian Islands, the Bahamas, and the south of Florida, forming, when well grown, a handsome tree with abundant laurel-like foliage. The flowers have an exquisitely sweet aromatic smell, due to the secretion in the glands studding the ovary. It is in cultivation in our Botanic Gardens, but has not flowered at Kew. In Nees' figure above quoted, the flowers are coloured scarlet, probably from confusion with *Cinnamodendron.*

Miers, Contrib. Bot., i, p. 112; Swartz, in Trans. Linn. Soc., i, p. 96; Grisebach, Fl. Brit. W. Indies, p. 109; Chapman, Fl. South. States, p. 43; Lindl., Fl. Med., p. 116.

Official Part and Name.—CANELLÆ ALBÆ CORTEX; the bark (B. P.). The bark (I. P.). CANELLA; the bark (U. S. P.).

Collection and Commerce.—It is said to have been collected formerly by first removing the entire bark with an iron instrument, then depriving it of a portion of its external cellular coats, and drying the remaining bark in the shade. But from recent information communicated to Hanbury, it appears that it is now collected in the Bahama Islands, where it is called *white wood bark* or *cinnamon bark,* as follows:—Preparatory to being stripped from the wood, the bark is gently beaten with a stick, which removes the suberous layer; by a further beating, the remaining bark is separated, and having been peeled off and dried, is exported without further preparation. It is shipped to Europe from Nassau, in New Providence.

General Characters and Composition.—Canella alba bark occurs

in more or less broken quills or pieces, which vary in length from two inches to a foot or more, in width from half an inch to one or two inches, and in thickness from one to two or three lines. The bark is generally somewhat twisted, and in some samples it is very much bruised and fissured longitudinally in consequence of the beating to which it has been subjected to in its removal from the wood. Externally it has a pale orange-brown or buff colour, and is usually marked by slight transverse wrinkles, and evident rounded depressions or scars. Internally it has a yellowish-white colour, and is nearly or quite smooth. It breaks with a short granular fracture, and the fractured surface shows distinctly the two layers (*mesophlæum* and *endophlæum*) of the bark, of which the canella of commerce is essentially composed. It has an aromatic, agreeable odour, resembling a mixture of cloves and cinnamon, and a bitter, pungent, acrid taste.

The principal constituent of Canella alba bark is a *volatile oil*, which was formerly said to be scented with oil of cloves, and sold for it. The amount of oil obtainable from canella alba bark varies from about 0·75 to 0·90 per cent. Canella alba bark also contains about 8 per cent. of *mannite*, which was formerly regarded as a peculiar saccharine substance, and named *canellin*; and also a *bitter principle*, which has not been isolated.

Substitutes.—Canella alba bark has been confounded with *Winter's Bark*, obtained from Drimys Winteri, *Forster*, a tree of the order Magnoliaceæ, and hence has been called *Spurious Winter's Bark*. The bark of a tree botanically allied to *Canella alba*, namely, the *Cinnamodendron corticosum*, Miers, which will be afterwards described, has been, however, known and used as Winter's Bark, both in England and elsewhere for a long period of time, and is, therefore, probably the bark referred to by writers for which canella alba bark was said to be substituted. Both kinds of Winter's bark may be readily distinguished from Canella alba bark by their general characters, and also chemically as follows:—A decoction of Cinnamodendron bark and also of true Winter's bark is blackened by a persalt of iron, which is not the case with that of Canella alba bark. By the addition of

potash to a cold aqueous infusion of true Winter's bark, a dark somewhat violet colour is also produced; whereas an infusion of Canella alba bark is but slightly altered under the same circumstances.

Medical Properties and Uses.—Canella alba bark is an aromatic stimulant and slight tonic. It is now, however, but rarely used except in combination with tonic or purgative medicines, as aloes, rhubarb, &c. It has been employed in dyspepsia, chronic forms of gout, rheumatism, syphilis, and other cases where a warm aromatic is indicated. In the West Indies it is used by the negroes as a condiment, and is also regarded as useful in scurvy.

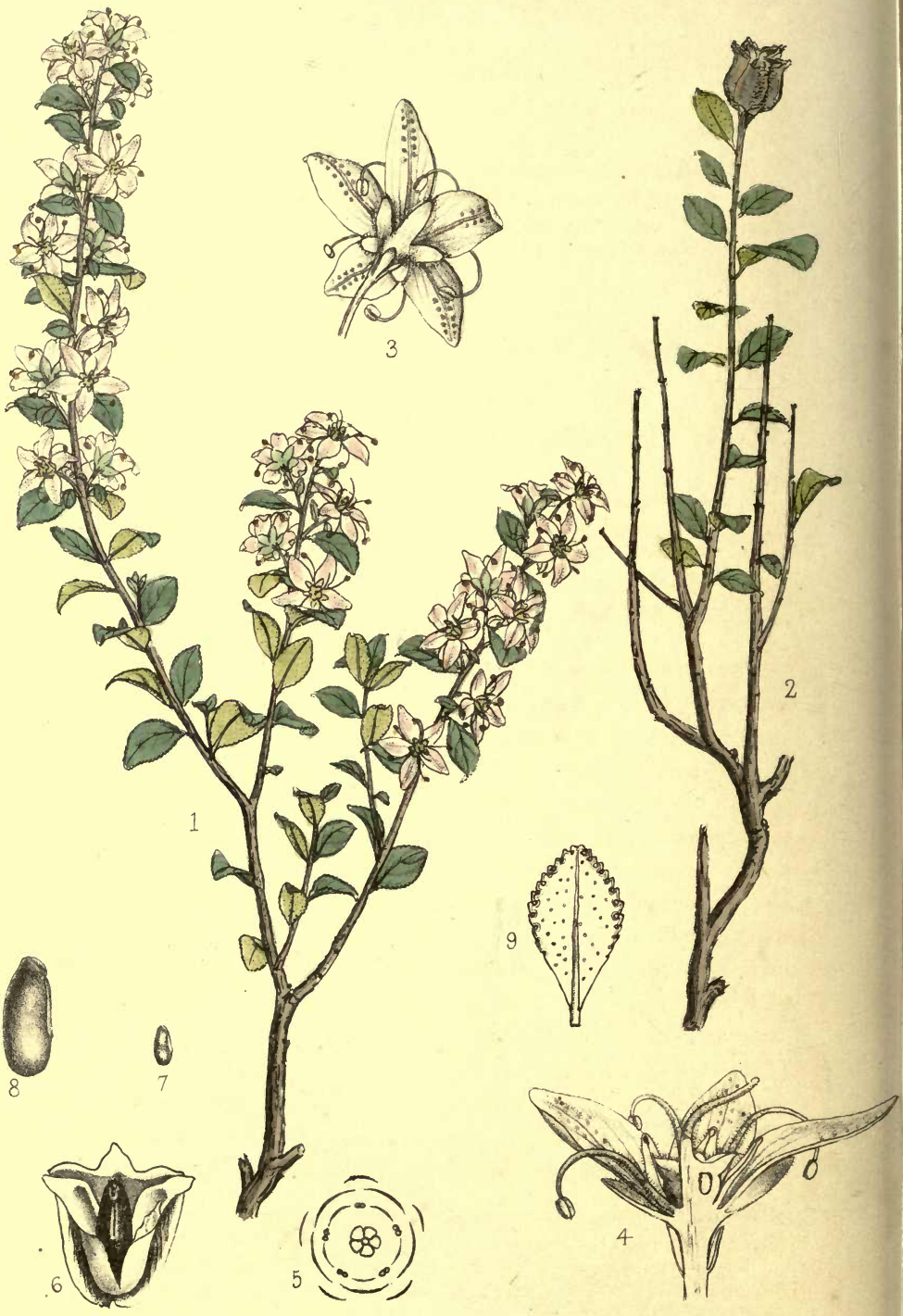
Per. Mat. Med., vol. ii, pt. 2, p. 532; Pharmacographia, pp. 19 and 68; Guibourt, Drogues Simples, tome iii, pp. 681 and 682; U. S. Disp., by W. & B., pp. 207 and 1720; Journ. de Pharm., vol. v, p. 481, and vol. viii, p. 197.

DESCRIPTION OF PLATE.

Drawn from a Jamaica specimen communicated by Mr. Miers.

1. A twig with leaves and flowers.
2. Vertical section of flower.
3. A flower with the petals removed.
4. The staminal tube laid out.
5. Transverse section of ovary.
6. Fruit.
7, 8. Seeds.
9. Section of the same.

(2–5 and 9 enlarged.)



D Blair ad sicc del. et lith.

M & N Hanhart imp.

BAROSMA BETULINA, *Bartl. & Wendl.*

N. Ord. RUTACEÆ. Lindl., Veg. K., p. 469; Baill., Hist. Pl., vol. iv.

Tribe *Diosmeæ*. Le Maout & Dec., Syst., p. 321.

Genus Barosma,* *Willd.* B. & H. Gen., i, p. 290; Baill., Hist., iv, p. 458; Berg, in Bot. Zeitung, 1853, 905–913; Harvey, Fl. Cap., i, pp. 392–4. Species about 12, natives of the Cape of Good Hope.

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45. Barosma betulina,† *Bartl. & Wendl. Beitr. z. Bot., Diosm., p.* 102 (1824).

Bucchu. Buchu. Bucco. Buku.

Syn.—Diosma betulina, *Thunb.*‡ Bucco betulina, *Roem. & Schultes.*‡ Hartogia capensis, *Bergius.* Diosma crenata, *DC., Lindl., Loddiges, Woodville,* &c. (non *Linn.*).

Figures.—Lodd., Bot. Cab., t. 404, cop. in Steph. & Ch., t. 121 and Woodville, vol. v; Berg & Sch., t. 1 f.

Description.—A small much-branched shrub; branches slender, somewhat twisted, slightly angular, with greyish-orange bark, young twigs set with oil glands. Leaves nearly sessile, opposite, or scattered, small, ½—¾ of an inch long, variable in form, usually cuneate- or rhomboid-obovate, texture cartilaginous, midrib prominent, lateral veins scarcely visible, apex very blunt, usually recurved, under surface slightly paler, with scattered glands, margin serrate-dentate with few close large cartilaginous teeth with glands in the serratures, nearly entire below. Flowers as in *B. crenulata*, Hook., but the petals somewhat narrower and more pink in colour; the fruit and seed appear also to be quite the same as in that species.

Habitat.—This species of *Barosma* grows in mountainous places in the district of Clanwilliam, north of Cape Town, and some other parts of the west of Cape Colony. In its extreme forms it can be readily distinguished from *B. crenulata* by its small rigid

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* Name from *βαρὺς*, heavy, and *ὀσμή*, smell.

† *Betulina*, from the leaves resembling those of the Birch.

‡ These synonyms are referred by Berg to his var. *β obovata* of *B. crenata*, Kunze.

cuneate leaves with their blunt recurved apex and cartilaginous margins set with large spreading denticulations. It must, however, be allowed that plants occur which it is difficult to place in either species, and of these the *B. crenata*, Kunze, with its two forms *ovalis* and *obovata*, seems to be composed.

This shrub was formerly cultivated in our gardens, having been introduced by Masson in 1774, but like many other Cape species has been lost.

Harv. & Sond., Fl. Cap., i, p. 393; Lindley, Fl. Med., p. 213.

Official Part and Names.—BUCHU FOLIA; the dried leaves of Barosma betulina, *Bart.*, Barosma crenulata, *Hook.*, and Barosma serratifolia, *Willd.* (B. P.). The dried leaves (*Barosmæ vel Buchu Folia*) of the above species of Barosma (I. P.). BUCHU; the leaves of Barosma crenata, and of other species of Barosma (U. S. P.).

Commerce.—The leaves of the species of Barosma now under notice, as well as of the other official species, are entirely derived from the Cape of Good Hope. In 1873, the total exports from the Cape Colony were about 400,000 lbs., of which nearly 60,000 lbs. were forwarded direct to the United States.

General Characters and Composition.—The general characters and composition of commercial Buchu are described under *Barosma crenulata.* The leaves of *Barosma betulina,* called in the United States Pharmacopœia *B. crenata,* the species now under notice, are commonly less esteemed than those of the other two official species, and are of less commercial value; although Professor Bedford, of New York, found them to yield on an average 1·21 per cent. of volatile oil, whilst the more highly valued leaves of *B. serratifolia* only yielded him 0·66 per cent. Flückiger and Hanbury obtained as much as 1·56 per cent. of volatile oil from the leaves of *B. betulina;* and as Buchu leaves owe their properties, in a great degree at least, to their volatile oil, there is no satisfactory evidence to indicate the inferiority of the present species. The leaves of *B. betulina* are

shorter than the other species, and from this circumstance they are known in commerce as *short buchu*, or from their more usual shape, they have been distinguished as *obovate buchu*. In the British Pharmacopœia they are briefly described as follows: About three quarters of an inch long, coriaceous, obovate, with a recurved truncated apex, and sharp cartilaginous spreading teeth.

Medical Properties and Uses.—Similar to the other species of Barosma: they are described under *B. crenulata*.

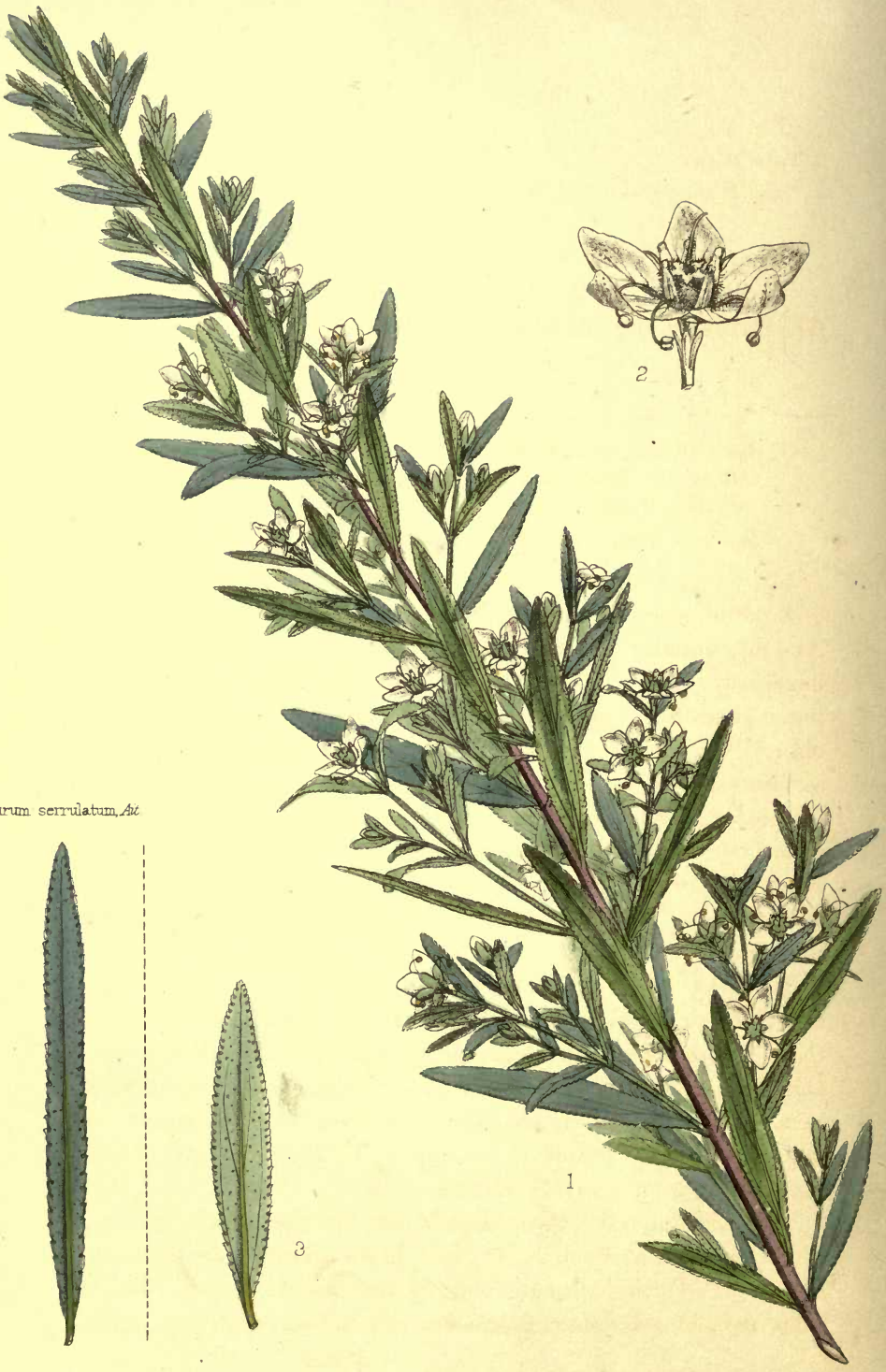
Per. Mat. Med., by B. & R., p. 888; Pharmacographia, p. 99; U. S. Disp., by W. & B., p. 182; Royle's Mat. Med., by J. Harley, p. 686; Proceed. Amer. Pharm. Assoc., 1863, p. 211.

DESCRIPTION OF PLATE.

Drawn from a Cape specimen in the British Museum, collected by Auge; the seeds added from Berg and Schmidt.

1. A flowering branch.
2. A branch bearing a solitary fruit.
3. Back view of a flower.
4. Vertical section of same.
5. Diagram of same (the petals should be imbricate).
6. Inside view of a coccus after dehiscence, showing the seed surrounded by the separated inner wall.
7, 8. Seed.
9. A leaf.

(3, 4, 6, 8, 9 enlarged.)



D.Blair ad sicc. delet lith.

M&N.Hanhart. imp

BAROSMA SERRATIFOLIA, *Willd.*

N. Ord. RUTACEÆ.
Tribe *Diosmeæ*.
Genus Barosma, *Willd.*

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47. Barosma serratifolia, *Willd. Enum. Plant, p.* 257 (1809).

Bucchu. Buchu. Bucco. Buku.

Syn.—Diosma serratifolia, *Curtis & others.* Baryosma serratifolia, *R. & S.* Adenandra serratifolia, *Link.* Parapetalifera serrata, *Bartl. & Wendl.*

Figures.—Nees, t. 378; Berg & Sch., t. 2 a; Bot. Mag., t. 456.

Description.—An erect shrub, several feet high, with slender, straight, angular branches; bark smooth, purplish-red. Leaves imperfectly opposite, very shortly stalked, 1 — 1½ inch long, linear-lanceolate, tapering to either end, the actual apex truncate-obtuse, margin sharply and closely serrate with glands in the serratures, under surface paler, with scattered oil-glands, midrib prominent, with 2 or 4 lateral veins, lower pair often running almost to the apex and giving the leaf a 3-ribbed appearance. Flowers as in *B. crenulata,* Hook., but petals always pure white; anthers purple before dehiscence. Fruit and seed as in the other species.

Habitat.—This kind of Buchu grows in the districts of George and Swellendam to the east of Cape Town, in damp situations on the mountain sides. It forms a neater bush than the other species, and was at one time in cultivation in England as a green-house shrub; specimens in flower from Kew Gardens, 1795, are in the British Museum. From *B. crenulata* the longer leaves with a blunt point are a ready distinction.

An allied Rutaceous shrub, *Empleurum serrulatum,* Ait., is sometimes imported as Buchu. Its leaf bears a strong similarity to that of *B. serratifolia,* but is much longer and narrower, with the sides parallel, the denticulations coarser, and the apex very acute.

Empleurum is quite different in floral structure, being apetalous, with large erect red anthers, and a monocarpellary horn-shaped fruit; it is well and completely figured in Berg and Schmidt, t. 2 b.

Harv. & Sond., l. c., p. 393; Lindley, Fl. Med., p. 213.

Official Part and Names.—Buchu Folia; the dried leaves of Barosma betulina, *Bart.*, Barosma crenulata, *Hook.*, and Barosma serratifolia, *Willd.* (B. P.). The dried leaves (*Barosmæ vel Buchu Folia*) of the above species of Barosma (I. P.). Buchu; the leaves of Barosma crenata, and of other species of Barosma (U. S. P.).

General Characters, Composition, and Commerce.—The general characters, composition, and commerce of Buchu have been already given under *Barosma betulina* and *Barosma crenulata.* The leaves of *Barosma serratifolia,* the species now under notice, are not liable to any great variation in size and shape, like those of the *B. crenulata,* and have been already fully described. From their length they are known in commerce as *long buchu.* In the British Pharmacopœia their characters are shortly given as follows:—"From an inch to an inch and a half long, linear-lanceolate, tapering at each end, sharply and finely serrated, three-nerved." From the shape of the leaves, this kind of Buchu is sometimes distinguished as *linear-lanceolate Buchu.*

Substitute.—The leaves of *Empleurum serrulatum,* Ait., a small shrubby plant, of the same natural order as *Barosma,* and inhabiting the same district, are not unfrequently imported and sold as Buchu. They are readily distinguished, as is indicated in the accompanying plate of *Barosma serratifolia,* by being narrower and longer; and likewise by their different odour. They also terminate in an acute point without an oil-gland; whereas the leaves of *Barosma serratifolia* are blunt or somewhat truncate, and always provided with an oil-gland at the apex.

Medical Properties and Uses.—Similar to the other species;

they have been already referred to under the head of *Barosma crenulata*.

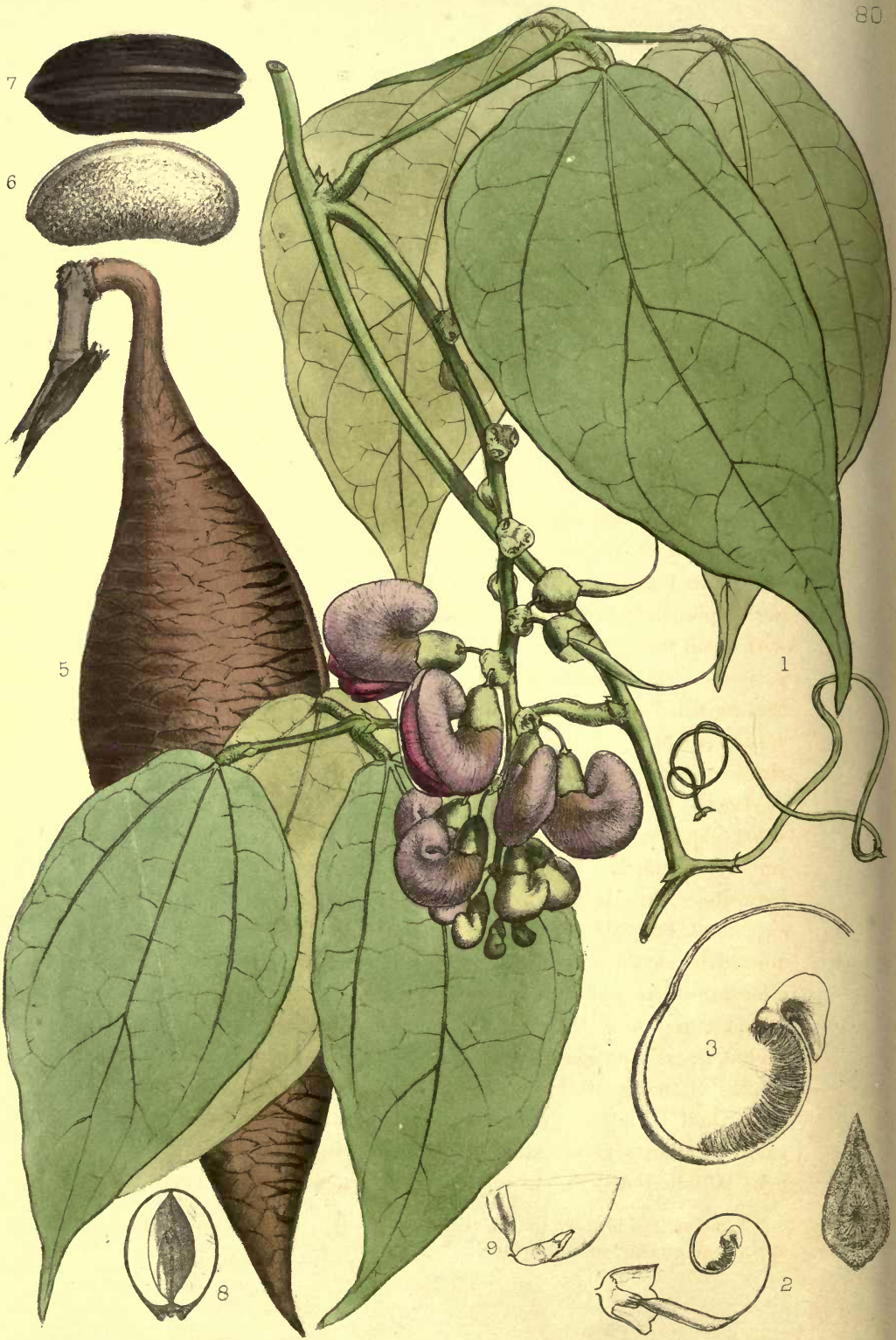
Per. Mat. Med., vol. ii, pt. 2, p. 399; Pharmacographia, p. 101; Gmelin's Chemistry, vol. xviii, p. 194; U. S. Disp., by W. and B., p. 183.

DESCRIPTION OF PLATE.

Drawn from a specimen in the British Museum, collected by Bowie at Knysna, George, Cape Colony.

1. A flowering branch.
2. A flower.
3. A leaf.

(2 and 3 enlarged.)



D.Blair ad sp.in alc.asserv.

M&N.Hanhart imp

PHYSOSTIGMA VENENOSUM *Balf*

N. Ord. LEGUMINOSÆ.

Tribe *Phaseoleæ*.

Genus Physostigma,* *Balfour*. B. & H., Gen., i, p. 538; Baill., l. c., p. 233. One species only known.

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80. Physostigma venenosum, *Balf. in Trans. Roy. Soc. Edinb.*, xxii, *p.* 310 (1861).

Calabar Bean.

Figures.—Trans. Royal Soc. Edinb., xxii, tt. 16, 17; Baill., l. c., figs 153–155.

Description.—A large perennial climber; the stem, which is woody and 2 inches in diameter below, reaching sometimes 50 feet in length, cylindrical, smooth, slender. Leaves alternate, large, pinnately trifoliolate; petiole stiff, thickened at the base, with small triangular stipules; leaflets stalked, with short thickened petiolules and small stipellæ, 3—6 inches long, ovate-attenuate, the terminal one broader, the lateral ones unequal at the base, veiny, smooth. Flowers rather large, in long, lax, pendulous zigzag racemes, with a thick rachis set with large solid tubercles or knots, from each of which spring two or three articulated, short, slender, smooth pedicels. Calyx cup-shaped gibbous above, smooth, somewhat fleshy, 5-lobed, the two upper lobes obsolete, truncate. Corolla papilionaceous; standard ovate-orbicular when expanded, but folded together and curved back into almost a ring, auriculate at the base, beautifully and finely veined; wings free, almost hidden by the standard, obovate-triangular, curved upwards, eared near the base, with a longish claw; keel half concealed, greatly prolonged and stiffly twisted into a somewhat spiral beak. Stamens 10, the upper one free, the other 9 combined for about half their length into a sheath round the pistil; anthers small, similar. Ovary stalked, the stalk surrounded by a prominent 10-lobed disk, style about 1½ inch long filiform, curved with

* From φύσα, a bladder, and stigma; on the supposition that the stigmatic appendage was hollow and inflated.

the keel and becoming thickened and stiff in its twisted beak, where it forms a ring densely bearded on the inner side of its distal half with crisp hairs, and provided at the extremity with a triangular, solid, fleshy, reflexed, beaked appendage. Pod shortly stalked, 4 to 7 inches long, compressed, pointed at the end, 2-valved, valves rather thin, horny, pale brown, with a network of transverse veins, thickly lined within with a white loose woolly tissue. Seeds 2 or 3 in the pod, oblong tending to reniform in outline, $1\frac{1}{4}$ inch long by $\frac{5}{8}$ inch wide, flattened on the back, rounded on the front, sides, and ends, hilum very long, linear, extending from the micropyle at one end entirely along the rounded side of the seed to the opposite extremity, with a raised border, and marked down the centre by a thread-like line (raphe); testa nearly smooth, dark chocolate-brown, paler on the borders of the hilum which is black, lined with a yellowish skin; cotyledons when dry semilunar on section, leaving a hollow space between them, with a shallow groove running down the side next the hilum; radicle short, terete.

Habitat.—A native of an apparently restricted portion of west tropical Africa, near the mouth of the Niger and Old Calabar, in the Gulf of Guinea; it seems to be somewhat rare even there, and is said to be destroyed everywhere by order of the government except where it is preserved for the use of justice, as an ordeal. The plant has been introduced, however, into Brazil and India. The seeds readily germinate; but in this country we believe that the plants have not as yet produced flowers. In appearance and structure *Physostigma* is very close to *Phaseolus*, in which genus is included the Scarlet Runner and Haricot Bean; indeed the remarkably large hilum of the seed and the stigmatic appendage are the only distinguishing characters. The late D. Hanbury first pointed out that this appendage is not hollow, but solid. We are indebted to Prof. Balfour for the loan of the original specimens from which he described the plant, as well as for a carefully coloured plate, of which the artist has availed himself.

Balfour, l. c., p. 310; D. Hanbury, in Journ. Botany, 1863, p. 239; Flora Trop. Africa, ii, p. 191.

Official Part and Names.—PHYSOSTIGMATIS FABA; the seed (B. P.). The seeds (*Physostigmatis Semina*) (I. P.). PHYSOSTIGMA; the seed (U. S. P.).

General Characters and Composition.—These seeds, which are commonly known as Calabar Beans, are imported from Western Africa. They are about the size of a very large horse bean, averaging from 1 to 1¼ inch long, ¾ of an inch broad, and 65 grains in weight. In shape they are somewhat reniform, being straight or slightly concave on one side, and convex on the other. The convex side is marked by a long, broad, black furrow (*hilum*), with raised edges, which terminates in a small depression or aperture (*micropyle*) near one end. The furrow is also traversed from end to end by a central raised line, which corresponds to the raphe. The seeds are covered by a hard, brittle, somewhat rough, shining integument or testa, which is commonly of a deep chocolate-brown colour, except on the raised edges of the furrow, where the tint is lighter. In some cases, however, the colour of the seeds is brownish-red or ash-grey. The nucleus or kernel principally consists of two hard, white, brittle, cotyledons, closely adherent to the testa, and separated from each other by a largish cavity. The seeds have no marked taste, simply that of an ordinary bean, and no odour. They yield their virtues entirely to alcohol, and imperfectly to water. The characters of Calabar beans are so marked, that they may be readily distinguished from all other seeds which may be mixed with them. We have frequently so noticed the seeds of a species of *Mucuna;* and others, have also detected those of the Oil Palm (*Elæis guineensis*).

Calabar beans contain about 48 per cent. of starch, 23 per cent. of albuminous matter, a little fatty oil, mucilage, sugar, and other unimportant ingredients, and a peculiar alkaloid on which their activity depends. This was discovered in 1863 by Jobst and Hesse, and named *physostigmin;* it is principally contained in the kernel, but as shown by Fraser, the shells are not devoid of active principle. The *physostigmia* or *physostigmin* as thus found by Jobst and Hesse is an amorphous

mass, of a brown colour, readily soluble in alcohol, ether, and acids, but less so in water. Its watery solution has an alkaline reaction; and on exposure to the air soon becomes red or sometimes blue, from a partial decomposition of the alkaloid. As subsequently obtained by Hesse, it was perfectly colourless and tasteless, and on exposure to a temperature of 212° it reddened, owing to decomposition commencing. In 1865, Vée and Leven, by operating in essentially the same manner as Hesse, obtained an alkaloid in the form of colourless, rhomboidal, tabular crystals, having a bitter taste, but agreeing in most other respects with the physostigmia, as just described. These chemists called this substance *eserin*. Tison and other chemists regard *eserin* or *eseria* as pure *physostigmia;* but Flückiger and Hanbury remark that "at present we feel hardly warranted in admitting the identity of the two substances." The activity of eseria or physostigmia? is indicated by the fact that if a single drop of a solution containing only 1 part in 1000, be placed within the eyelids, it causes great and lasting contraction of the pupil. A peculiarity of the alkaloid, according to Vée is, that if to its solution in water a little potash, lime, or soda be added, a red coloration is produced, which rapidly becomes more intense. The colour is not, however, permanent, but gradually passes into yellow, green, and blue. The same property is also said to be possessed by the alcoholic extract of Calabar bean.

Medical Properties and Uses.—From the experiments of Dr Fraser and others, it has been proved that Calabar bean is a powerful sedative of the spinal cord, producing in over-doses paralysis of the lower extremities and death by asphyxia, or in still larger doses, death by paralysis of the heart. When applied locally to the eye, it rapidly induces contraction of the pupil. The principal use of the Calabar bean is as a local application to the eye, to cause contraction of the pupil, in certain diseases and injuries of that organ. It has also been given internally in small doses, and with some benefit, in tetanus, chorea, epilepsy, and other nervous affections; also in the treatment of strychnia poisoning, general paralysis of the insane, and other affections.

The physiological antagonism of atropia and physostigma would also direct attention to the use of the latter in poisoning by the former. Atropia has also been found useful in poisoning by the Calabar bean.

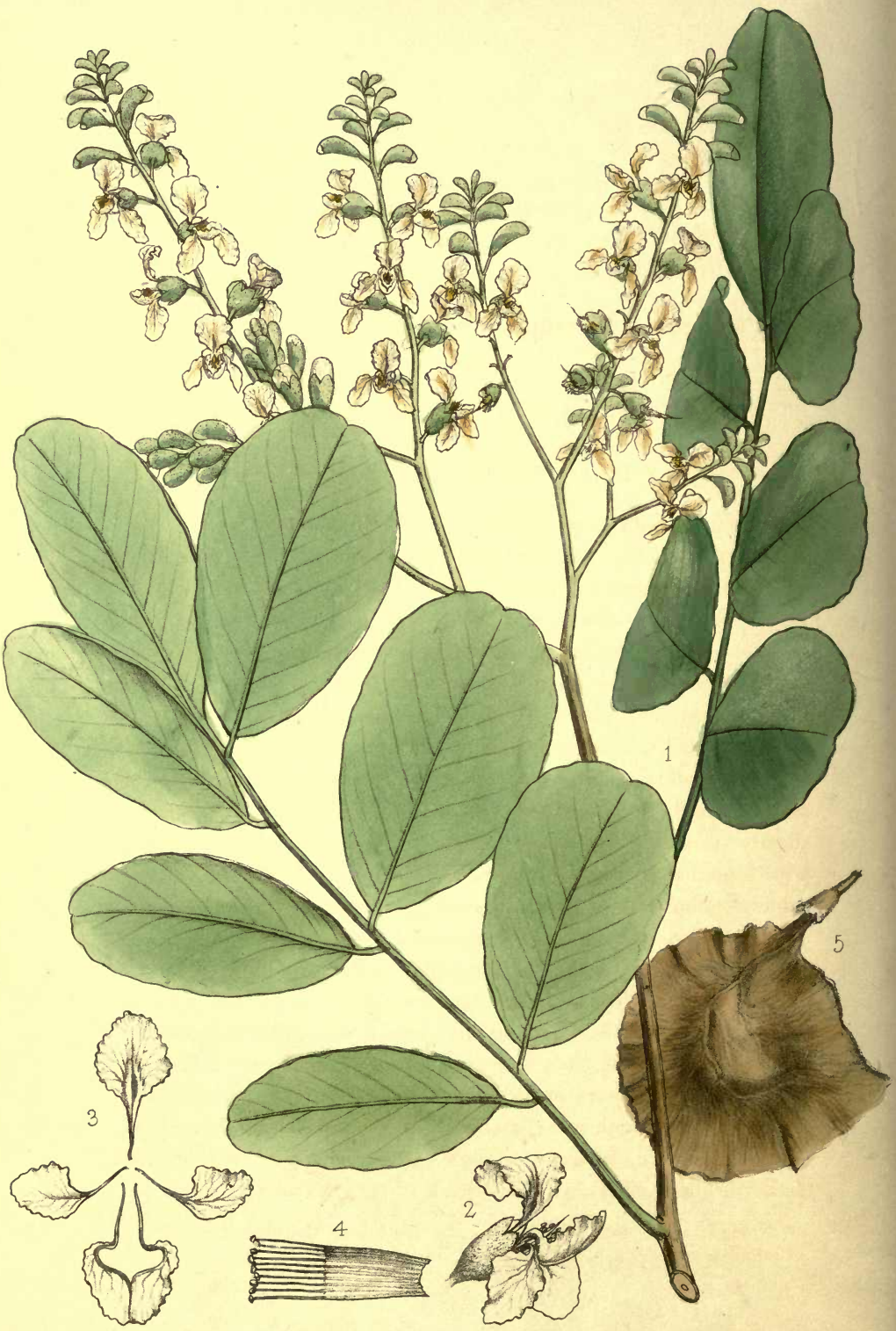
Per. Mat. Med., by B. & R., p. 842; Pharmacographia, p. 167; U. S. Disp., by W. & B., p. 669; Journ. de Pharm., 1864, p. 277; Chem. News, 22 March, 1867, p. 149; Mayer, Amer. Journ. Pharm., 1865, p. 173; Comptes Rendus, 1865, p. 1194; Edin. Journ. Med. Science, vol. xx, p. 193; Pharm. Jl., vol. xiv, p. 470; Fraser, in Edin. Med. Journ., July, 1863, p. 36; Robertson, Edin. Med. Journ., March, 1863, p. 815; Bouchat, Bull. Gener. de Therap., 1875.

DESCRIPTION OF PLATE.

The flowering branch from a specimen in spirit collected at Old Calabar, in the collection of the late D. Hanbury; the fruit from a specimen in the British Museum, collected at Old Calabar by the Rev. Z. Baillie.

1. A flowering branch.
2. Pistil, half of the calyx removed.
3. Terminal part of style and appendage.
4. Transverse section through the appendage.
5. A pod.
6, 7. Seeds.
8. Transverse section of a dry seed.
9. Base of one cotyledon, showing radicle and plumule.

(3, 4 and 9 enlarged.)



D.Blair ad sicc del. et lith.

M&N Hanhart imp

PTEROCARPUS MARSUPIUM, *Roxb.*

N. Ord. LEGUMINOSÆ.

Tribe *Dalbergieæ*.

Genus Pterocarpus,* *Linn.* B. & H., Gen., i, p. 547; Baill., l. c., p. 319. Species 15, inhabiting tropical Asia, Africa, and America.

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81. Pterocarpus Marsupium,† *Roxburgh, Plants of Coromandel, ii, p. 9 (1798).*

Vengay (Tamil). *Buja* (Bengal). *Bastard Teak.*

Figures.—Roxburgh, l. c., t. 116; Beddome, Fl. Sylvatica, t. 21.

Description.—A large deciduous tree with an erect trunk 6—8 feet in girth and numerous spreading horizontal branches, bark brownish-grey, coming off in flakes, the inner bark fibrous, red. Leaves abundant, alternate, without stipules (?), unequally pinnate, petioles round, slender, slightly thickened at the base; leaflets 5 to 7, alternate, on short thickened stalks, oval or oblong-ovate, 2—4 inches long, blunt or subacute, emarginate, entire, coriaceous, smooth, dark green and shining when full grown, with numerous lateral veins connected by raised reticulations. Flowers rather small, in lax terminal or axillary paniculate racemes, shortly stalked, the peduncles and pedicels more or less silky with adpressed hairs, bracts minute deciduous, buds curved. Calyx tubular-campanulate with 5 short nearly equal blunt teeth, very shortly silky. Corolla papilionaceous, petals nearly equal with long claws, wavy at the margins, pale yellow; standard narrow, recurved, wings free, turned down, keel-petals connected in front, curved upwards. Stamens 10, filaments monadelphous, forming a tube for about half their length, sometimes split into 2 bundles of 5 stamens, anthers small. Pistil small, stipitate, hairy, style pointed. Pod indehiscent, stalked, greatly compressed, orbicular, 1—1½ inch wide, falcate the style having become lateral, hard, leathery, finely silky, with a broad, crisped, veined, parchment-

* Name from πτερόν, a wing, and καρπός, fruit, from the winged legumes.

† *Marsupium*, a pouch, from the shape of the fruit.

like wing. Seed solitary, kidney-shaped, or two separated by a strong partition, without endosperm.

Habitat.—This fine timber tree grows in the forests of Southern and Central India, where it was formerly common, but has become nearly extirpated in many places, and large trees are now rare. It is also found in Ceylon. The flowers appear in May and June.

Roxb., Fl. Indica, iii, p. 234; Brandis, Forest Fl. Ind., p. 152; Royle, in Pharm. Journ., v (1846), p. 495; Lindl., Fl. Med., p. 256.

Official Part and Name.—KINO; the inspissated juice obtained from incisions made in the trunk (B. P.). The inspissated juice obtained from incisions in the trunk (*Kino*) (I. P.). KINO; the inspissated juice of Pterocarpus Marsupium, and of other plants (U. S. P.).

Varieties of Kino.—The term kino is applied to the juice of the tree now under consideration, as well as to that of other plants, inspissated without artificial heat. Several varieties are known to pharmacologists; but those commonly distinguished in Europe, the United States, and India, are as follows :—1. *Malabar* or *East Indian Kino,* from Pterocarpus Marsupium, *D. C.;* 2. *African* or *Gambia Kino,* from Pterocarpus erinaceus, *Poiret;* 3. *Butea, Bengal, Palas* or *Pulas Kino,* or *Butea Gum,* from Butea frondosa, *Roxb.,* and allied species of Butea; 4. *Botany Bay, Australian,* or *Eucalyptus Kino,* from numerous species of Eucalyptus; 5. *West Indian* or *Jamaica Kino,* from Coccoloba uvifera, *L.;* and 6. *South American* or *Caracas Kino,* which is supposed by some authors to be the same kind as that described by Guibourt, under the name of *Columbian Kino.* The botanical source of the latter variety is not known with certainty; though believed by Wood and Bache to be derived from the same plant as that yielding West Indian Kino. Some of these varieties of kino have the appearance of extracts, rather than that of juices inspissated without artificial heat, to which the term kino is only strictly applicable. All of them have similar medical properties, and

analogous chemical characters, and some have a considerable similarity of appearance. In the British Pharmacopœia Malabar or East Indian Kino is alone official; in the Pharmacopœia of India, this kind as well as Bengal or Butea Kino are recognised; while in the Pharmacopœia of the United States, East Indian Kino, and also that of other plants are official. Our future remarks in this article will refer simply to Malabar or East Indian Kino, but the more important of the other varieties are described under the plants yielding them.

Malabar or East Indian Kino.—*Extraction and Commerce.*—This kind of kino derives its name from being obtained in the forests of Malabar, where permission is granted by government for its collection, on the payment of a small fee. In order to obtain it, the trees are incised as follows:—A perpendicular incision, with lateral ones leading into it, is made in the trunk, when the juice, which has the appearance of red currant jelly, exudes, and is collected by placing a suitable vessel at the lower end of the incision. This juice is then dried by exposure to the sun and air, and subsequently packed in wooden boxes for exportation. The amount of kino exported from Malabar is said not to exceed two tons annually.

General Characters and Composition.—Malabar kino is found in small, angular, very brittle, glistening fragments, of a reddish-black colour. When entire the fragments are opaque; but in thin laminæ and at the edges they are transparent, and of a ruby-red colour. They are without odour; but with a very astringent taste; and when chewed they stick to the teeth, and tinge the saliva blood-red. Kino is partially dissolved by cold water, more readily by boiling water, and almost entirely soluble in spirit of wine of specific gravity 0·838. All these solutions have a red colour, the intensity of which will depend upon the quantity of kino taken up; the solution in boiling water becomes turbid on cooling, and deposits a red sediment. The spirituous solution has an acid reaction on litmus paper; and when long kept it frequently assumes a gelatinous condition. Kino is altogether insoluble in ether.

In a chemical point of view kino closely resembles Pegu Catechu derived from Acacia Catechu, *Willd.*, and Pale Catechu from Uncaria Gambier, *Roxb.*, both of which are described under the plants yielding them. Its essential constituents are *catechin* or probably *pyrocatechin*, *kino-tannic acid*, and *kino-red*.

Medical Properties and Use.—In its action kino is closely allied to catechu, but on account of its comparative insolubility it is less astringent, and is, therefore, commonly regarded as less effective. It may be used, however, in all cases where tannin is indicated, that is, internally in diarrhœa and pyrosis; in the form of a gargle in relaxed throat; as an injection in leucorrhœa, &c.; and as a topical application to indolent and flabby ulcers.

Kino is also used in the manufacture of wines; and would be valuable as a tanning and dyeing agent if it could be obtained at a moderate price.

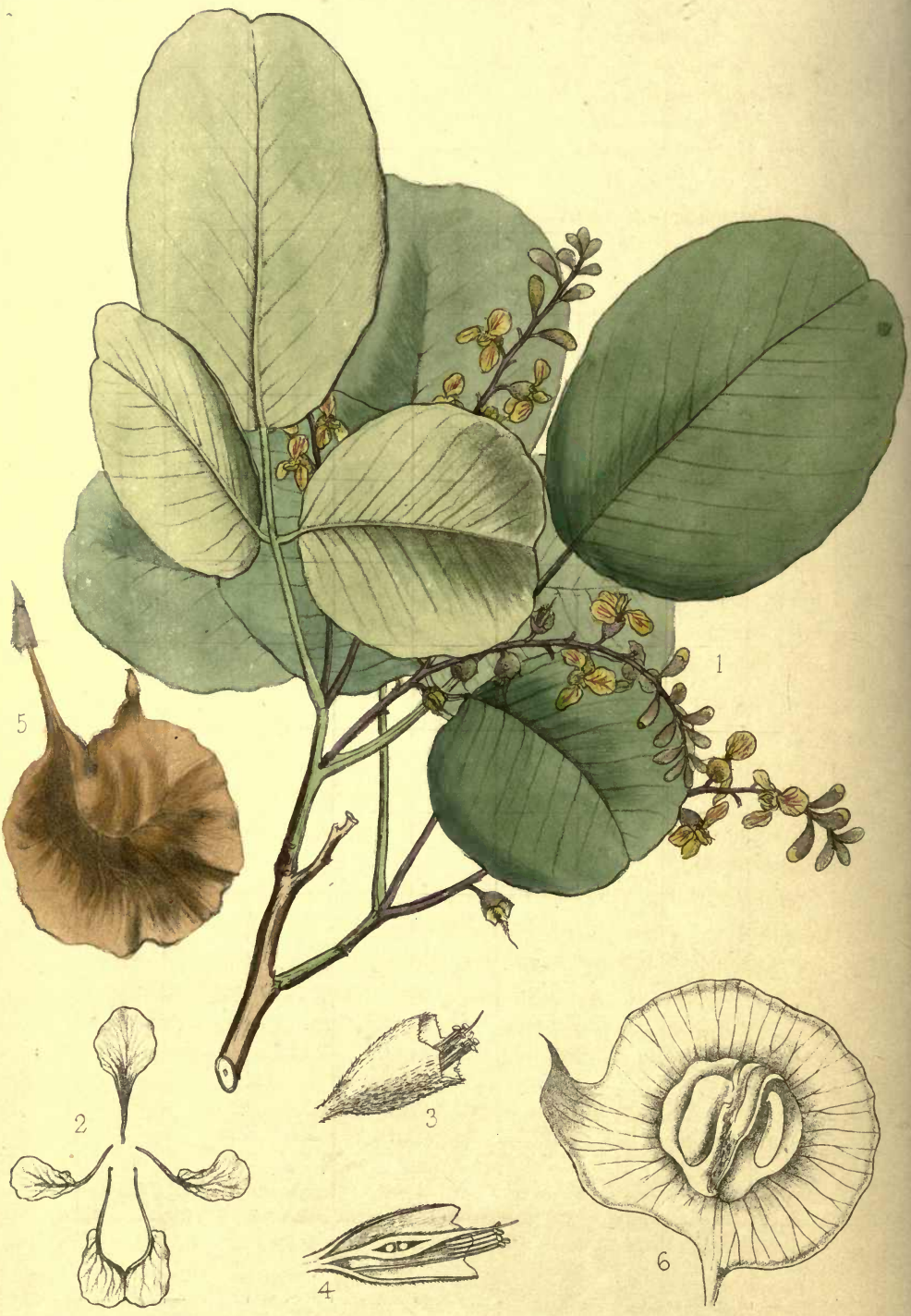
Per. Mat. Med., vol. ii, pt. 2, p. 325; Pharmacographia, p. 171; U. S. Disp., by W. & B., p. 509; Royle, Pharm. Journ., vol. v, 1st ser., p. 495; Daniell, Pharm. Journ., 1st ser., vol. xiv, p. 55; Cleghorn, Forests and Gardens of South India, p. 13 (1861).

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum; the fruit collected in India by Roxburgh, the flowering branch by Thwaites in Ceylon (no. 1495).

1. A branch with flowers.
2. A flower.
3. The petals separated.
4. The tube of stamens.
5. Fruit.

(2–4 enlarged.)



D.Blair ad sicc del. et lith.

M&N.Harhart imp

N. Ord. LEGUMINOSÆ.
Tribe *Dalbergieæ*.
Genus Pterocarpus, *Linn.*

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82. Pterocarpus santalinus,* *Linn. f., Suppl. Pl., p.* 318 (1781).

Chandam. Chundana. Red Sanders Wood. Ruby Wood.

Figures.—Woodville, t. 156 (drawn from Koenig's specimen in Herb. Banks); Beddome, Fl. Sylvatica, t. 22.

Description.—A small tree about 20 to 25 feet high, the trunks of very old and hollow ones reaching as much as 4½ feet in circumference. Leaves alternate, without stipules, on round downy petioles, always trifoliolate; leaflets articulated, the lower pair alternate or sub-opposite, all on short stalks, broadly oval or sub-orbicular, rounded at both ends and deeply emarginate, 2—6 inches long, coriaceous, slightly silky below, veins numerous, not prominent. Flowers much as in *P. Marsupium*, but a little smaller, and the petals less crisped, yellow; stamens diadelphous in 2 bundles of 5 each. Pod very like that of the last, but with a less crisped wing and a longer stalk, downy. Seeds 2 or solitary.

Habitat.—The Red Sanders Wood is a rare tree found in abundance only in a few parts of the Madras Presidency, on low hills, and nowhere else in India. It is readily distinguished from *P. Marsupium* by its constantly trifoliolate and broader leaflets. Plantations have been formed for its cultivation in S. India.

Roxb., Fl. Ind., iii, p. 234; Lindl., Fl. Med., p. 257.

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* *Santalinus*, referring to its name of red *Sandal* wood, which all its Indian titles signify, though it bears no relationship to *Santalum*.

Official Part and Names. — PTEROCARPI LIGNUM; the wood (B. P.). The wood (*Lignum Santalinum rubrum*) (I. P.). SANTALUM; the wood (U. S. P.).

General Characters and Composition.—Red Sandal Wood, Red Sanders or Saunders Wood, is generally imported from Ceylon; and as found in English commerce, it is principally obtained from the lower parts of the stem, and from the thick roots. It occurs in roundish, somewhat angular, or irregular logs or billets, which are without bark and sapwood, from about three to five feet in length, and in some cases as thick as a man's thigh, although usually much smaller. These billets are heavy, dense, externally dark reddish- or blackish-brown, and internally, if cut transversely, of a deep blood-red, variegated with zones of a lighter red colour. The wood is usually found in the pharmacies in the form of raspings, chips, or coarse powder, of a deep reddish-brown colour. Red Sandal Wood has a very slightly astringent taste, and is almost odourless, although when rubbed it has a faint peculiar smell.

The colouring principle of red sandal wood is almost insoluble in water, either hot or cold, and also in fixed oils, such as almond and olive; but it is readily soluble in ether, alcohol, concentrated acetic acid, and alkaline solutions, and forms deep coloured solutions. It is also insoluble in oil of turpentine; but partially soluble in some of the essential oils, as those of lavender, rosemary, cloves, and oil of bitter almonds. This colouring principle, which is termed *santalic acid* or *santalin,* is a resinous ruby-coloured substance, without taste or odour, fusing at 202°, and forming uncrystallisable salts with alkalies. Weidel also obtained from the wood a minute quantity of colourless, tasteless crystals, which he called *santal.* The wood also contains a small quantity of some kind of tannin, probably *kino-tannic acid.*

Medical Properties and Uses.—Although much used in India as an astringent, it can scarcely be said to have any virtue as a medicine, but to be simply useful as a colouring agent.

The chief use of red sanders wood is as a dye stuff. Thus in India it is employed mixed with sapan wood, for dyeing silk,

cotton, and wool, to which it imparts reds of various shades, according to the kind of mordant used.

Pharmacographia, p. 175; U. S. Disp., by W. & B., p. 772; Gmelin's Chemistry, vol. xvi, p. 259; Ure's Dict. Arts, vol. iii, p. 631; Amer. Journ. Pharm., Jan., 1860, p. 6.

DESCRIPTION OF PLATE.

Drawn from Indian specimens in the British Museum, collected by Koenig and by Hamilton; the section of the fruit added from Beddome's figure.

1. A flowering branch.
2. Petals separated.
3. Calyx with stamens and pistil.
4. Section of the same.
5. Fruit.
6. Section of the same.

(2–4 enlarged.)

D.Blair ad. sicc. del. et lith.

M&N.Hanhart imp.

HEMIDESMUS INDICUS, *R. Br.*

N. Ord. ASCLEPIADACEÆ. Lindl., Veg. K., p. 623; Le Maout & Dec., p. 551.

Tribe *Periplocæ*.

Genus Hemidesmus,* *R. Br.* DC. Prod., viii, p. 494. Species 3, natives of India.

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174. Hemidesmus indicus, *R. Brown, in Mem. Werner. Soc., i, p.* 56 (1811).

Nunnari. Indian Sarsaparilla.

Syn.—Periploca indica, *Willd.* P. emetica, *Retz.* Asclepias Pseudo-Sarsa, *Roxb.*

Figures.—Rheede, Hort. Malab., x, t. 34; Delessert, Ic. Select., v, t. 55; Wight, Ic. Pl. Ind. Or., ii, t. 594; Burman, Thes. Zeylan., t. 83, f. 1.

Description.—A twining shrub with numerous very slender, woody, diffuse, smooth stems, and a slender, slightly branched, tortuous root; branches much elongated, whip-like, simple, smooth. Leaves opposite, very shortly stalked, dark-green, smooth, shining, variable in form, ovate, oval, oblong, lanceolate or almost linear, usually broadest on the upper branches, acute at the apex, margin entire; stipules very small, caducous. Flowers small, in little clusters of 5 or 6 in the axils of the leaves, shortly stalked, the pedicel with several imbricated, acute, ovate, minutely laciniated bracts, Calyx very deeply divided into 5 ovate, acute segments with a strong midrib, finely ciliated, imbricate. Corolla rotate, very deeply 5-cleft, the segments ovate, acute, valvate, texture leathery, deep purple and wrinkled within, green outside, the short tube with a prominent laterally compressed rounded ridge alternating with the segments. Stamens 5, inserted at the very base of the corolla-tube immediately behind the prominent ridges; filaments long, slender, free for their whole length,† connectives wide, prolonged beyond the anthers into

* Name from ἡμί, half, and δεσμός, a bond, from the partial connection of the stamens.

† So in the specimen examined. Brown, however, found them "basi connata," and this is probably their usual condition.

triangular inflexed appendages, which are united by their margins to form a horizontal cover to the stigma; anther-cells small, in contact with but free from the stigma, smooth; pollen collected into masses, 2 in each cell, and becoming attached in fours to the dilated apex of each angle of the stigma. Ovaries 2, small, compressed; styles united to form a short, thick, tapering body; stigma large, thick, capitate, bluntly pentagonous, smooth, the top slightly raised in the centre. Fruit of 2 widely divaricated follicles, about 4 inches long, straight, linear, tapering, smooth, dehiscing along the ventral suture. Seeds numerous, overlapping, elongated, brownish-black, provided with a long tuft of white hairs at the hilum; embryo straight, in scanty endosperm.

Habitat.—This grows throughout the Indian Peninsula, and is a common and well-known plant, being found in uncultivated places everywhere. The great variety in the form of the leaves is remarkable, and led the native Hindoos to make two species of the plant, but every variety of leaf may be found on stems coming off from one root.

Roxb., Fl. India, ii, p. 39; Decaisne, in DC. Prod., viii, p. 494; Lindl., Fl. Med., p. 543.

Official Part and Name.—HEMIDESMI RADIX; the dried root (B. P.). The root (*Hemidesmi Radix*) (I. P.). It is not official in the Pharmacopœia of the United States.

General Characters and Composition.—Hemidesmus root is imported from India. It is commonly known under the name of *Indian Sarsaparilla;* and also in India as *Nunnari Root.* It occurs in pieces of various lengths, but rarely less than 6 inches; and commonly from about $\frac{1}{5}$ to $\frac{1}{2}$ an inch in thickness, although thicker roots are sometimes to be found. The roots are more or less twisted, unbranched or furnished with a few small rootlets, cylindrical, furrowed longitudinally, and the cortical portion divided transversely so as to form annular cracks. It has a yellowish-brown or dark brown colour externally; a peculiar fragrant odour, resembling that of melilot or the tonquin bean; and a sweetish agreeable taste, combined with a very slight

acridity. A transverse section shows that the root is composed of a thin cortical portion, which is of a corky texture, somewhat mealy, and commonly of a white or brownish colour; and a yellowish woody centre (*meditullium*), which is separated from the cortical portion by a narrow dark wavy ring, representing the cambium layer.

The root as found in commerce is frequently of bad quality, and in many cases has portions of the aerial stems attached; these are almost tasteless and inodorous, and inferior in properties to the root. Waring says that the fresher the root the greater is its efficacy.

No satisfactory chemical examination of hemidesmus root has as yet been made. Its properties are said to depend upon a volatile oil and a peculiar crystallisable principle called *hemidesmine;* but according to Christison and Dr. Scott, of Madras, the latter substance is only a stearoptene.

Medical Properties and Uses.—In India it is regarded as possessing similar properties to sarsaparilla, and is employed as a substitute for that substance, as an alterative, tonic, diuretic, and diaphoretic. Waring, in the Pharmacopœia of India, speaks highly of its value, more especially of that of the fresh root; but in this country and in the United States of America it is but little esteemed.

Per. Mat. Med., by B. & R., p. 660; Pharmacographia, p. 379; U. S. Disp., by W. & B., p. 451; Pharmacopœia of India, pp. 140 and 457.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum, collected at Tranquebar and Ceylon. 1. A young flowering stem. 2. Portion of another branch, with fruit. 3. A single flower. 4. Base of corolla, showing the androecium. 5. Summit of the androecium, showing the united anther-processes. 6. Calyx and pistil (the ovaries and styles should have been shown to be separated). 7. Anther in the bud. 8. Hooded appendix, containing the pollen masses. 9. The same expanded. 10. A seed. (3–6 enlarged; 7–9 after Delessert.)

D. Blair ad. nat. del. et lith.

M&N Henhart imp.

ILLICIUM ANISATUM Linn.

N. Ord. MAGNOLIACEÆ. Lindl., Veg. K., p. 417; Le Maout & Dec., p. 192; Baill., Hist. Pl., vol. i.

Tribe *Wintereæ*.

Genus Illicium,* *Linn.* B. & H., Gen., i, p. 18; Baill., l. c., p. 183. Species 5, natives of Asia and North America.

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10. Illicium anisatum,† *Linn., Sp. Plant, ed.* 2, *p.* 664 (1764).

Star-Anise. Skimmi (Japan).

Syn.—I. religiosum, *Siebold & Zuccarini.*

Figures.—Nees, t. 371; Hayne, xii, t. 29; Berg & Sch., t. 30 f; Bot. Mag., t. 3965; Sieb. & Zuccar., Fl. Japon., i, t. 1; Miers, Contrib. Bot., i, t. 27 c; Baill., Hist. Pl., i, figs. 195–199.

Description. — A small tree reaching about 20 feet high, much branched, with smooth, round branches, young twigs marked with the scars of fallen leaves and spotted with brown. Leaves evergreen, alternate, rather crowded, without stipules, stalked, lanceolate or oblong-lanceolate, tapering and pointed at both ends, quite entire, smooth, shining, thick, with minute pellucid dots, the lateral veins scarcely visible, 2—3 inches long, on the young shoots much larger, 5—6 inches long. Flowers on the young shoots of the year apparently terminal, afterwards axillary, and sometimes coming from the old wood, solitary, or in clusters of threes, shortly stalked, the pedicel surrounded at the base with about six rounded, slightly ciliated bracts, faintly sweet-scented. Sepals 3—6, roundish, caducous, membranous, petaloid, imbricated. Petals about 24 (but varying in number), imbricated in three or more series, spreading, narrow-oblong, blunt, gradually smaller towards the centre, deciduous, pale greenish-yellow. Stamens indefinite (often about 16 or 20) in several rows, hypogynous; filaments thick, short, dilated; anthers adnate, introrse, dehiscing laterally. Carpels 5—15 (often 8) in a single whorl, free, erect, compressed, 1-celled; style

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* *Illicium*, an allurement, from the odour and attractive appearance.

† *Anisatum*, from the scent of the fruit, like Anise.

slender, short, slightly recurved, with the brownish stigma on its ventral surface. Fruit consisting of 8 or more coriaceous-woody, wrinkled, boat-shaped, more or less beaked, orange-brown follicles arranged in a radiated, spreading circle, and attached by their bases to a central axis, dehiscing along their ventral (upper) margin by a broad chink, internally bright yellow and shining. Seed solitary, in a cavity scooped out in the lower part of the carpel, attached to the axis, ovoid, compressed, polished and shining, hilum large, embryo very small, immersed in the abundant endosperm near the hilum.

Habitat.—This shrub is planted in the neighbourhood of the temples in Japan and is cultivated in China. In the former it was first collected by Kaempfer and Thunberg, in the latter by Loureiro. The plants of the two countries have been considered to be different species in consequence of the fruits of the Japanese tree being somewhat less rough, and having a sharper and more recurved beak. It is now, however, generally held (Miquel, Baillon) that the differences are of but little value. As cultivated in England, where it was introduced in 1842, it is found to vary in the size of the flowers and leaves. It produces abundance of its pretty scented blossoms from January to April, and sometimes also in the autumn.

Kaempfer, Amœn. Exotic. (1712), p. 880; Loureiro, Fl. Cochin, i, p. 353; DC. Syst. Veg., i, p. 441; Adansonia, viii (1867), p. 1; Franchet & Savatier, Enum. Pl. Jap., i, p. 15; Lindl., Fl. Med., p. 25.

Official Parts and Names.—Oleum Anisi; the oil distilled in Europe from the fruit of Pimpinella Anisum, *Linn.*, and the oil distilled in China from the fruit of Illicium anisatum, *Linn.* (B. P.). The fruit (*Star Anise*) (I. P.) Not official in the United States Pharmacopœia; the official oil of anise being there directed to be obtained from Pimpinella Anisum only.

1. The Fruit.—The fruit of *Illicium anisatum* is commonly termed Star-Anise, from its stellately-arranged carpels. In its

dried state, as seen in commerce, it is composed of generally 8, or rarely 9 or more carpels, which are arranged nearly horizontally in a single row, and diverging from one another from the short central column, to which they are attached, in a star-like manner. This central column is commonly placed upon a short, more or less oblique stalk or pedicel. Each carpel is boat-shaped, more or less beaked at its apex, irregularly wrinkled below, of a rusty or reddish-brown colour, and commonly split open on its upper margin, so as to expose the solitary seed which it contains. The seed is nearly oval in shape, oblique at the base, somewhat compressed, smooth and shining, and of a brownish-red colour. Star-anise has a pleasant aromatic odour and taste, resembling a mixture of fennel and anise. Flückiger and Hanbury state that the seeds are not aromatic, but this does not accord with our experience, for we find them distinctly so in commercial specimens. Star-anise is imported into Europe, the United States, and India, from China. Formerly it was brought to Europe by way of Russia, and hence the names by which it was then designated, *Cardamomum Siberiense* and *Anis de Sibérie.*

2. Oleum Anisi. *Oil of Anise.*—In the British and Indian Pharmacopœias, as above noticed, oil of anise is directed to be obtained from the fruit of the plant now under notice, and from the fruit of *Pimpinella Anisum ;* while in the United States Pharmacopœia the oil from the latter plant is alone official. Oil of Star-Anise is sometimes known as *Oleum Badiani.* It is imported from China. The amount of volatile oil which may be obtained from star-anise has been variously stated at from 2·8 to 5 per cent. ; the average quantity being probably about 4 per cent. In its general characters and composition it closely resembles the oil of anise obtained from the fruit of *Pimpinella Anisum ;* indeed, Flückiger and Hanbury say, " We are unable to give characters by which they can be discriminated, although they are distinguished by dealers." Oil of Star-anise is now largely used in this country in place of the European oil of anise, and in the United States of America, although not official, as already mentioned, it is said to have almost entirely superseded the latter oil, to which it is by

many regarded as much superior. The general characters and composition of oil of anise are described under *Pimpinella Anisum*.

Medical Properties and Uses.—The medical properties and uses of oil of anise are given under *Pimpinella Anisum*.

Star-Anise fruit is much esteemed in India and China. It is a great deal employed on the Continent, more especially in Italy, France, and Germany, to flavour spirits.

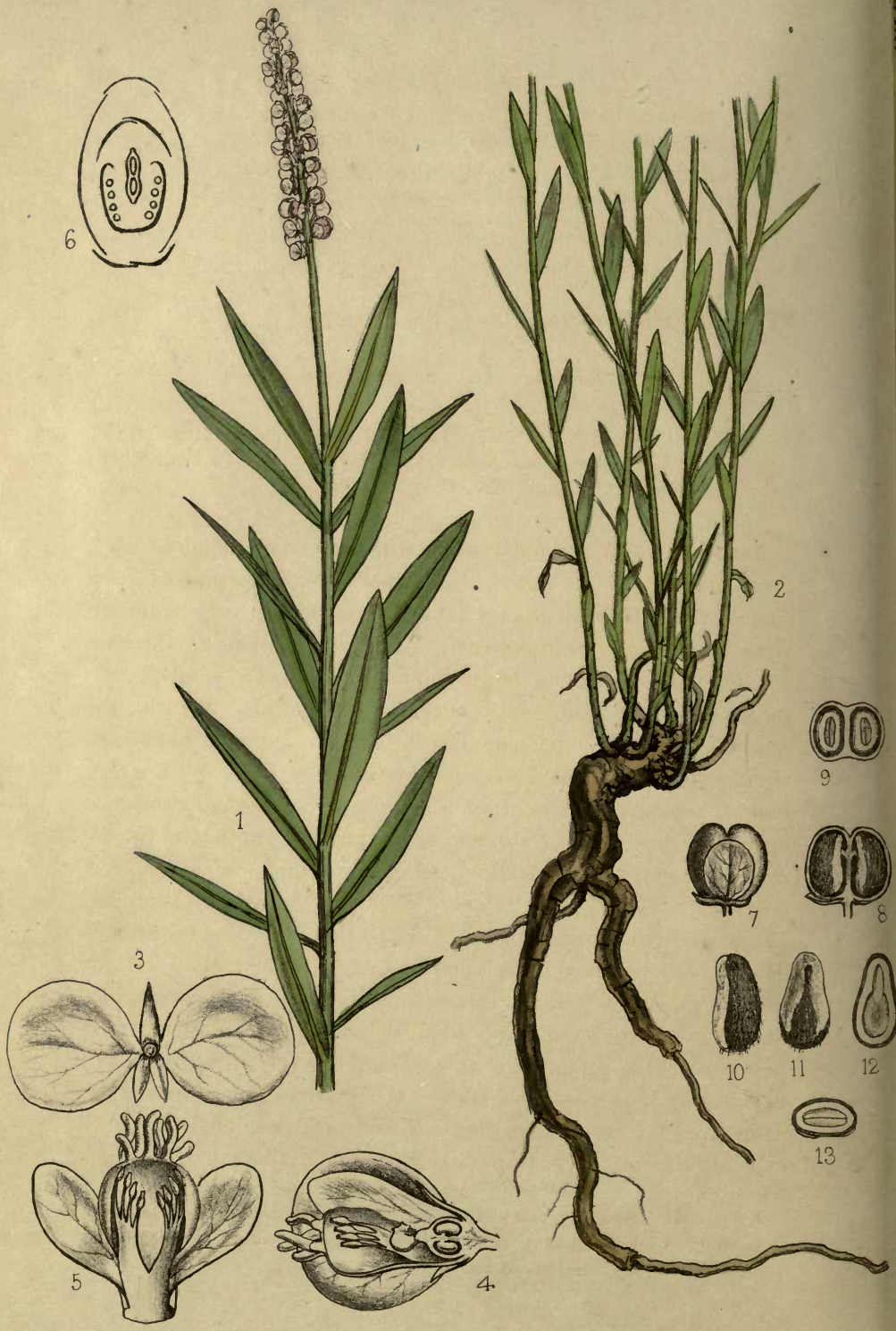
Per. Mat. Med., vol. ii, pt. 2, pp. 163 and 677; Pharmacographia, p. 20; U. S. Disp., by W. & B., p. 1303; Ph. Jl., vol. v, 2nd ser., p. 484.

DESCRIPTION OF PLATE.

Drawn from a plant at Kew Gardens in flower in January; the fruit from Chinese specimens in the British Museum.

1. A flowering branch.
2. Vertical section of flower.
3. Back, and—4. Front view of stamens.
5. Pistil and receptacle.
6. Ripe fruit, back view.
7. The same seen from above.
8. A carpel opened, showing the seed.
9. Seed.
10. Section of the same.

(2–5, 8, 9 enlarged.)



D.Blair ad sicc. del et lith.

M & N. Hanhart imp.

POLYGALA SENEGA, *Linn.*

N. Ord. POLYGALACEÆ. Lindl., Veg. K., p. 375; Le Maout & Dec., p. 249; Baill., Hist. Pl., vol. v.

Genus Polygala,* *Linn.* B. & H., Gen., i, p. 136; Baill., l. c., p. 87. Species about 200 or more, natives of all parts of the world in temperate and warm countries.

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29. Polygala Senega,† *Linn., Sp. Plant., ed.* 1, *p.* 704 (1753).

Rattlesnake-root. Seneca Snake-root.

Figures.—Woodville, t. 162?; Barton, ii, t. 36, cop. in Steph. & Ch., t. 103; Bigelow, t. 30; Nees, t. 412; Hayne, xiii, t. 21; Berg & Sch., t. 10 a; Bot. Mag., t. 1051; Gray, Ill. Gen. U. S., t. 183.

Description.—A perennial herb, with numerous slender, wiry, erect, smooth, simple stems, 6—12 inches high, coming off from the somewhat dilated knotty crown of a thick, hard, contorted, slightly branched, irregular root. Leaves very small at the base of the stems, becoming larger upwards, alternate, sessile, exstipulate, narrowly lanceolate, acute at both ends, smooth, the margins rather rough, pale below. Flowers small, numerous, shortly stalked, crowded in a narrow terminal spike ½—2 inches long. Sepals 5, persistent, of which the upper one and two lower are small, green, lanceolate, and acute, and the two lateral (inner) ones (wings) large, petaloid, slightly veined, orbicular and concave, enclosing the petals. Petals 3, hypogynous, united below, the two lateral oblong, blunt, veiny, the lower one cup-shaped, and provided at the end on the exterior with a tuft of filiform processes (crest). Stamens 8, lying in the lower petal, united into two bundles of 4 (diadelphous), the bundles fused below with the petals, free above; anthers very small, 1-celled, opening by a pore at the apex. Ovary laterally compressed, 2-celled by a transverse partition, with one pendulous ovule in either cell; style large, curved upwards into a thick blunt beak. Fruit

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* *Polygala*, from πολύς, much, and γάλα, milk; from the supposed effects.

† *Senega*, from the Seneca tribe of North American Indians, among whom the plant was used as a remedy for snake-bites.

a small 2-celled capsule, partially covered by the persistent calyx-wings, dehiscing loculicidally. Seeds 2, black, hairy, with a white caruncle extending from the hilum along the inner side almost to the other end of the seed; embryo in the axis of scanty endosperm, straight, with flat cotyledons.

Habitat.—A native of North America, extending from the northern parts of Canada, through the Northern United States southward, to North Carolina and Tenessee, found in woods and growing in dry rocky soil. It flowers in May and June, is quite hardy, and was formerly in cultivation in our botanic gardens, but is not now to be met with in those to which we have had access.

Hook., Fl. Bor. Am., i, p. 85; Gray, Man. Bot. U. S., p. 122; Chapman, Fl. South. States, p. 85; Lindl., Med. Bot., p. 125.

Official Part and Names.—Senegæ Radix; the dried root (B. P.). The dried root (*Senegæ Radix*) (I. P.). Senega; the root (U. S. P.).

Collection.—It is collected for use in the southern and western parts of the United States, whence it is forwarded to Europe and other parts of the world.

General Characters and Composition.—*Senega, Seneka,* or *Seneca root,* or as it is sometimes termed *Seneka Snake-Root,* varies in thickness from that of a straw to that of the little finger; it is tapering, branched, twisted or somewhat spiral, and terminated at its upper end in a thick irregular knotty crown or tuberosity, which exhibits traces of numerous wiry aerial stems, and scaly rudimentary leaves. A projecting line or keel-shaped sinewy looking ridge extends along the whole length of the concave side of the root. The bark is more or less wrinkled, somewhat knotted, transversely cracked so as to be partially annulated, horny, translucent, and varying in colour from light yellowish-grey in the branches and smaller roots to brownish-grey in the larger pieces. The bark surrounds a white central woody column or meditullium, which is about the same thickness as itself. Senega root is brittle, and presents a short fracture; its odour is peculiar,

disagreeable, and rancid; and its taste at first sweetish, but ultimately very acrid and sourish, and when chewed exciting cough and salivation. The odour and taste reside entirely in the bark or cortical portion, the meditullium being quite inert.

Senega root owes its properties essentially to the presence of a peculiar principle which has been termed *senegin* or *polygalic acid*, which is said to be closely allied to *saponin*. Senega root also contains a little *volatile oil*, *resin*, *sugar*, and other unimportant constituents. Senegin is a white amorphous powder, insoluble in cold water and ether, but soluble in alcohol and boiling water, with which latter it forms a feebly acid frothy solution. According to Procter, the root yields about 5½ per cent. of senegin, which is present in the bark only. Senegin is a poisonous substance, with a very acrid taste, and excites violent sneezing. Quevenne regards it as a *glucoside*, as it is resolvable by the dilute mineral acids and alkalies into a jelly-like substance called *sapogenin*, and *sugar*, which remains in solution.

Adulterations.—Senega root does not appear to be intentionally adulterated, but from carelessness in collection some other roots or rhizomes in small proportion may be frequently found mixed with it. American Ginseng root, from *Panax quinquefolium*, is that most commonly found, and is readily distinguished by its greater size, more or less fusiform shape, and by the absence of any projecting line. The roots of *Gillenia trifoliata* and other species of *Gillenia*; and the rhizome of *Cypripedium pubescens* have also been noticed in parcels of senega root. They are readily distinguished by the absence of any projecting line, and by their different taste and odour.

Medical Properties and Uses.—Senega root was introduced into practice as a remedy for the bite of the rattlesnake, but it is now known to be useless in such a case, and also in the bites of other venomous reptiles. Senega root appears to excite, more or less, nearly all the secretions, acting as a sialagogue, diaphoretic, expectorant, diuretic, and emmenagogue, in moderate doses; and as an emetic and cathartic in large doses. It is, however, chiefly employed as a stimulating expectorant. It has been much used,

and is regarded generally as a valuable remedy in chronic bronchitis and chronic pneumonia. It has also been employed in croup, whooping-cough, humoral asthma, dropsy depending on kidney disease, palpitations connected with disease of the heart, amenorrhœa, dysmenorrhœa, rheumatism, and other diseases. It is frequently combined with great advantage with carbonate of ammonia, as in chronic bronchitis, and also with other expectorants and diuretics, as squill, &c.

Per. Mat. Med., vol. ii, pt. 2, p. 566; Pharmacographia, p. 72; U. S. Disp., by W. & B., p. 795; Garr., Mat. Med., p. 211; Journ. de Pharm., vol. xxii, p. 449, and vol. xxiii, p. 227; Amer. Journ. Pharm., vol. xxvii, p. 45, and March, 1860, p. 150.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum collected in Virginia and Ohio, U. S. A.

1. Upper part of a flowering stem.
2. Lower portion of a plant.
3. Calyx seen from below.
4. Vertical section of the flower.
5. Corolla and stamens seen from above.
6. Plan of the flower.
7. Capsule.
8. Vertical, and—9. Transverse section of the same.
10, 11. Seed, showing the caruncle.
12. Vertical, and—13. Transverse section of seed.

(3–13 enlarged.)

D.Blair ad nat.delethth.

M&N Hanhart imp

CAMELLIA THEA, *Linn.*

N. Ord. TERNSTROEMIACEÆ. Lindl., Veg. K., p. 396; Le Maout and Dec., p. 271; Baill., Hist. Pl., vol. iv.

Tribe *Gordonieæ*.

Genus Camellia,* *Linn.* (including *Thea*, Linn.). B. & H., Gen., i, p. 187; Baill., l. c., p. 227 (*Thea*). Species 15 or more, growing in tropical and eastern Asia and the Indian Archipelago.

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34. Camellia Thea,† *Link, Enum. Plant. Hort. Reg. Bot. Berol. Alt.*, ii, *p.* 73 (1822).

Tea.

Syn.—Thea chinensis, *Linn.* T. viridis, *Linn.* T. Bohea, *Linn.* T. stricta, *Hayne.* T. Assamica, *Masters.* Camellia theifera, *Griffith* (1838).

Figures.—Woodville, t. 225; Hayne, vii, tt. 27, 28, 29; Nees, tt. 426–28; Bot. Mag., tt. 998 and 3148; Griffith, Notulæ ad Plant. Asiat., iv, t. 601, f. 1 and 3; Trans. Linn. Soc., xxii, t. 61 (Assam plant); Baill., l. c., figs. 244—250.

Description.—A small, much-branched, evergreen shrub, with slender branches covered with a smooth pale-brown bark; young twigs and buds downy. Leaves alternate, shortly stalked, somewhat variable in form and size, usually 2—4 inches long, oval or lanceolate, pointed at each end or bluntish and emarginate at the apex, irregularly and rather distantly dentate-serrate except at the base, thick, smooth and shining on both sides or slightly downy beneath, dark green, paler below, veins strongly marked with the leaf convex and rather bullate in the intervals. Flowers solitary or two or three together on short branchlets in the leaf-axils, somewhat drooping, on short stalks with a few small bracts,

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* George Joseph Camel, or Camelli, was a Dutch Jesuit missionary in Luzon, and a first-rate naturalist. His plants, drawings, and descriptions were sent to Holland in 1700, afterwards came in the hands of Petiver, and are now in the British Museum.

† *Thea*, a Latin rendering of the Chinese *Téh*, and first employed by Kaempfer. "Nomen barbarum," says Linnæus, who retained it, however, for this divine plant, as though *Thea* might mean *Dea* (see Hort. Cliff., p. 205).

about 1 or 1½ inch wide. Sepals 5, imbricate, slightly united below, ovate or rounded, blunt, smooth, persistent. Petals usually 5, often more, up to 9, rather unequal, strongly imbricated, rounded, concave, spreading, white, caducous. Stamens indefinite, adherent to the petals at their base in two rows, filaments flexuose, about half the length of the petals, anthers large, versatile. Ovary small, free, conical, downy, 3-celled, with 3 or 4 pendulous ovules in each cell; styles three, distinct or combined at the base, slender, with simple stigmas. Fruit a smooth, flattened, rounded-trigonous, 3-celled capsule, with a thin, brown, woody pericarp splitting loculicidally. Seed solitary in each cell, as large as a small nut, rounded on the back with usually flattened sides marked by impressions of the abortive ovules, testa hard, smooth, cinnamon brown, brittle, the interior marked with ramifying vessels, hilum large, nearly circular or oval, inner coat thin, pale brown; embryo straight, with large, thick, coalescent, unequal cotyledons, and a very short radicle at the hilum; no endosperm.

Habitat.—It is considered probable that the Tea-plant is really native in Upper Assam, and that it was introduced into China in very early times from India. Its cultivation on an immense scale is now carried on in China, several parts of India (especially Assam), Japan, Java, and the Southern United States. All botanists are now agreed that the various kinds of tea are the product of a single species, nor does it appear to vary so much as was formerly supposed. In the case of a plant so long under cultivation, a considerable range of form is to be expected. The cultivated races have in many cases a much more stunted habit than the Assam plant, with knotty branches, and the leaves frequently much smaller (¾ inch long or even less), thicker and more obtuse.

As regards *Thea* as a genus distinct from *Camellia*, Seemann was of opinion that they could be separated by the staminal arrangement, but more recent writers have failed to find this constant, and the persistent sepals and nodding flowers alone are insufficient distinctions for generic definition. Seemann described five species under *Thea* besides the Tea of commerce. Baillon keeps the name *Thea* instead of *Camellia* for the combined genera.

Well-grown plants are very ornamental, and are common in botanic gardens; the shrub was introduced in 1768. The flowers are produced in autumn and winter, but rarely appear here in the open air.

Seemann in Trans. Linn. Soc., xxii, p. 349; Fl. Brit. Ind., i, p. 292; Lindl., Fl. Med., p. 349.

Part Used and Name.—THEA, *Tea;* the dried leaves. To distinguish it from other Teas it is also called China Tea. It is not official in either the British, Indian, or United States' Pharmacopœia.

Preparation and Kinds of Tea.—There are two well-marked kinds of Tea distinguished as Black and Green, of each of which we have several commercial varieties. Thus, of Black Teas, the best known sorts are, Congou, Souchong, Oolong, Pekoe, and Caper; and of Green Teas—Hyson, Hyson Skin, Young Hyson, Twankay, Imperial, and Gunpowder. Many teas are scented with the flowers of different plants, as those of the orange, rose, jasmine, sweet-scented olive, &c. The finest teas, some of which sell for as much as 50*s.* per lb., are never forwarded to this country, but are consumed by the wealthier classes in China and Russia. It is not within our province to allude to all these varieties of tea, but only to describe generally the differences between black and green tea.

Black and Green Tea.—It was formerly supposed that black and green tea were the produce of distinct plants, but Fortune, Ball, and others, have proved that both kinds are prepared indiscriminately from the same plant, the differences between such teas depending essentially upon their mode of preparation. Thus, *Green Tea* is prepared as follows:—first, the leaves are exposed after they are gathered for from one to two hours to the atmosphere, for the purpose of drying off any superfluous moisture; they are then put for four or five minutes into the roasting-pan, which is heated below with a brisk wood fire, and during which time they are rapidly moved about by the hands of the workmen.

In this heating process they become quite moist and flaccid, and give off at the same time a considerable portion of vapour. They are then removed and placed upon the rolling table, where they are rolled into balls, and during which process they are subjected to great compression with the object of twisting them, and at the same time getting rid of a portion of their moisture. When the leaves have taken the requisite twist they are removed from the rolling table and shaken out upon flat trays; after which they are thrown again into the pan, which is heated by a slow and steady charcoal fire and where they are kept in rapid motion by the workmen, and in about an hour or an hour and a half the leaves are well dried and have assumed a dullish green colour. The leaves are subsequently winnowed and passed through sieves of different sizes to get rid of the dust and other impurities, and then sorted into the different varieties known as hyson, twankay, gunpowder, &c. By this time the colour is more developed, and the finer sorts have become dull blueish-green.

In the preparation of *Black Tea*, the leaves after having been gathered are spread out and allowed to lie exposed to the air for a considerable time, generally about twelve hours; they are then gathered up and tossed about by the workmen until they become soft and flaccid, after which they are thrown in heaps and allowed to lie in this state for an hour or more; they are then put into an iron pan, where they are roasted for about five minutes, and manipulated as green tea under similar circumstances; and then rolled. After being rolled the leaves are shaken out and thinly spread on sieves, and exposed to the air out of doors for about three hours, after which they are put for a second time into the roasting pan for three or four minutes, and then taken out and rolled again as before. The leaves are subsequently placed in a sieve which is put in a basket, and exposed in this manner to the heat of a charcoal fire for five or six minutes; after which they are rolled for the third time and again heated in a similar way for a little while longer, and are finally dried in baskets over a slow charcoal fire, by which their black colour is fully brought out. They are then sifted,

picked, and sorted into the different varieties, as congou, souchong, &c.

The differences, therefore, in the manufacture of green and black tea are most marked, and fully sufficient to account for their differences of colour and other peculiarities. Thus, Green Tea consists of the leaves quickly dried after gathering, so that their colour and other characters are in a great measure preserved; and Black Tea consists of the leaves dried some time after being gathered, and after they have undergone a kind of fermentation, by which their original green colour is changed to black, and other important changes produced. It should be noticed, however, that a great part of the Green Tea which is exported from China, and consumed in this country and in Europe generally, and also in America, is coloured artificially with a mixture of Prussian blue and gypsum, or indigo and gypsum, to which a little turmeric is sometimes added. Both black and green teas are also frequently adulterated with the leaves of different plants, and in other ways, but the consideration of this subject does not come within our province.

Commerce and Consumption.—The great tea-producing country is China, where it is said four millions of acres of ground are devoted to its cultivation, and the produce annually is estimated at nearly three thousand millions of pounds. Tea is also largely produced in Japan, Java, Assam, and other countries. In India it is also now becoming an important article of commerce; thus, in 1873 the total produce was over 20,000,000 lbs., and the value of tea exported from Calcutta was £1,692,699.

The consumption of tea in all parts of the world must be enormous, as it is more or less partaken of by probably six hundred millions of persons, or about one half of the whole human race. In the United Kingdom the consumption of tea has very much increased of late years. Thus, in 1840 it was about 50,000,000 lbs., in 1856 it was 63,000,000 lbs., in 1867 more than 100,000,000 lbs., while in 1873 it amounted to over 132,000,000 lbs., and it is yearly increasing.

General Characters and Composition.—The different varieties

of tea vary very much in colour, odour, flavour, strength, and shape caused by the degree in which their constituent leaves have been rolled, and in other particulars. These differences arise, more especially as we have seen, from their different modes of preparation, and hence they may be all arranged under the two heads of *Green* and *Black teas*. The colour, odour, and taste of both green and black teas are communicated to hot water, an infusion of the former having a more or less greenish-yellow colour, a peculiar, somewhat aromatic odour, and an astringent, feebly pungent, and agreeably bitter taste; while an infusion of the latter has a dark brown colour, a somewhat similar but generally less agreeable odour, and an astringent, bitterish, but less pungent taste. The odour, taste, &c., of the different varieties of tea vary, however, excessively, and are too well known to require further notice here.

The properties of tea depend essentially on the presence of a *volatile oil, tannic acid,* and the alkaloid *thein*. This alkaloid is also alluded to under *Paullinia sorbilis,* where it is said to be identical with *caffein,* the alkaloid of coffee, and to be contained in five different substances, namely, tea, coffee, guarana, Paraguay tea, and Kola-nuts. Cocoa seeds also contain an alkaloid, as is noticed under *Theobroma Cacao,* called *theobromin,* which closely resembles *thein* both in its chemical characters and effects. The amount of volatile oil varies in different teas from about 0·6 to 0·79 per cent.; that of tannic acid from 13 to 18 per cent.; and of thein, from 2 to 4 per cent. Tea also contains about 6 per cent. of *gluten.*

Properties and Uses.—The principal use of tea is to form an agreeable, slightly stimulating, soothing, and refreshing beverage. It was also formerly believed that tea from the thein it contained, had the effect of diminishing the waste of the body, and as any substance that does this necessarily saves food, it was regarded as indirectly nutritive; but Dr. Edward Smith has shown that, on the contrary, tea increases the bodily waste by acting as a respiratory excitant, and in other ways. From containing gluten, tea has also been regarded as directly nutritive, but in the

ordinary mode of making tea this substance is scarcely extracted in any amount. The action of tea is thus stated by Dr. Edward Smith :—" It increases the assimilation of food both of the flesh and heat-forming kinds ; and with abundance of food must promote nutrition, whilst in the absence of sufficient food it increases the waste of the body." It is frequently resorted to by those who desire to produce wakefulness during the night for the purpose of study, &c. Tea is also a powerful astringent, and should not, therefore, be taken for some time after animal food, otherwise it commonly produces dyspepsia, in consequence of the formation of tannate of gelatine, from the combination of its tannic acid with the gelatine of the food. In consequence of its astringent properties the use of tea also frequently causes constipation. Tea should not be taken as a beverage by those who sleep lightly, or by those who are liable to hysteria, or palpitation of the heart from valvular disease.

As a nervine stimulant tea may be taken with great advantage in headache and neuralgia, and in other affections caused by exhaustion of the system from depression of nerve power. Its effects in such cases are said to be analogous to quinia, and hence tea has also been given in intermittent fevers, &c. It has also been employed medicinally in the treatment of opium and other narcotic poisonings ; and in asthma, whooping-cough, and other spasmodic disorders. For use medicinally green tea is to be preferred. Experiments show that the effects of tea as a nervine stimulant are due to thein, as its administration produces analogous effects on the system, and may be, therefore, used medicinally in similar cases.

Royle's Illust. of Himalayan Botany, p. 109; Johnston's Chemistry of Common Life, by Lewes, vol. i, p. 158; Fortune's Tea Countries of China, vol. ii, pp. 69 and 233; Bent., Man. Bot., p. 445; U. S. Disp., by W. & B., p. 1708; Royle's Mat. Med., by J. Harley, p. 704; Per. Mat. Med., vol. ii, pt. 2, p. 551; Garr., Mat. Med., p. 220; Warington, in Chem. Gaz., 1852, p. 238; Watts, Dict. Chem., vol. v, p. 703; Pharm. Jl.,

vol. iv, p. 37, vol. x, p. 618, and vol. xv, p. 112; Amer. Jl. Med. Sci., April, 1868, p. 525, and Oct., 1868, p. 260.

DESCRIPTION OF PLATE.

Drawn from a plant in cultivation at the Royal Gardens, Kew, in flower in January.

1. A young shoot with flowers.
2. A petal with the adherent stamens.
3. Attachment of stamens to petal.
4. An anther.
5. Vertical, and—6. Transverse section of ovary.
7. Fruit.
8. Seed.
9. Section of the same.

(2–6 enlarged.)

D Blair ad sicc. del. et lith.

M&N Hanhart imp.

MELALEUCA MINOR, *Sm.*

N. Ord. MYRTACEÆ. Lindl., Veg. K., p. 734; Le Maout & Dec., p. 422.

Tribe *Leptospermeæ*.

Genus Melaleuca,* *Linn.* B. & H., Gen., i, p. 705. Species over 100, natives of Australia, with a single (?) species widely spread through tropical Asia.

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108. Melaleuca minor, *Smith in Rees' Cyclop.*, vol. xxiii (1813).

Kayu-puti. White-wood. Cajuput.

Syn.—M. Cajuputi, *Roxb.* M. Leucadendron, var., *Benth.*

Figures.—Woodville, t. 195; Hayne, x, t. 9; Nees, t. 300 and Supp.; Trans. Med. Bot. Soc. Lond., t. 1, cop. in S. & C., t. 84, and Woodv., vol. v; Berg & Sch., t. 3 c; Rumph., Herb. Amboyn., ii, t. 17.

Description.—A rather small, irregularly growing tree, with a smooth, pale yellowish-grey, brittle bark, which splits into numerous thin layers, and slender flexuose branches. Leaves alternate or subopposite, when young very silky, when full grown rigid, tapering below into a very short petiole, blade twisted vertically, so that its edges look upwards and downwards, 2½—4 inches long, lanceolate or ovate-lanceolate, often oblique or falcate, acute or rather blunt, quite entire, nerved with several parallel anastomosing veins. Flowers sessile, arranged usually in threes in terminal interrupted spikes about 2 or 3 inches long, with a scaly bud at the end, which grows out afterwards into a leafy branch, the rachis covered with white silky pubescence. Calyx-tube thick, about ⅛ inch long, densely silky, cup-shaped; lobes 5, short, rounded, somewhat scarious. Petals 5, rounded, inserted in the mouth of the calyx, spreading, white. Stamens indefinite, filaments very slender, greatly exceeding the petals, united into 5 ribband-shaped bundles below, which are inserted in the mouth of the calyx opposite the petals, anthers small, versatile. Ovary enclosed in the calyx-tube and half inferior, convex above, with a central hollow from which the filiform style arises,

* Name from μέλας, black, and λευκὸς, white. Derivation not obvious; said to be from the different colour of the bark of the trunk and branches.

3-celled, ovules numerous, in several rows ascending from large axile placentas, stigma faintly 3-lobed. Fruit becoming woody and very hard, sessile on the sides of the branches and remaining several years, small, rounded, truncate, enclosed in the thickened calyx-tube, and crowned by its free portion, dehiscing on the summit loculicidally into three valves, 3-celled. Seeds cuneate, flattened (many abortive), testa thin, embryo with large thick cotyledons, no endosperm.

Habitat.—The tree yielding Cajuput oil grows in several of the East Indian Islands, notably in Celebes, Bouro, and Amboyna, and perhaps also in the Phillippines, Cochin China, and New Caledonia. The leaves vary somewhat in breadth and have a strong aromatic fragrance. Mr. Bentham considers it a form of *M. Leucadendron,* in which he also includes the other East Indian described species, and remarks that none of the characters supposed to separate them are sufficiently constant or so combined as to allow of their definition. As, however, it appears that it is this form only from which the oil is obtained, we have maintained the specific name, without intending thereby to express any opinion as to its distinctness from the common Australian "Tea-tree," *M. Leucadendron,* L. The plant was introduced into the Royal Gardens at Kew in 1775 and is still grown there, where, however, it does not flower.

Colebrooke, in Trans. Med. Bot. Soc. Lond., i, p. 27; Benth., Fl. Austral., iii, p. 142; Lindl., Fl. Med., p. 73.

Official Part and Name.—Oleum Cajuputi; the oil distilled from the leaves (B. P.). The oil distilled from the leaves (I. P.). Oleum Cajuputi; the volatile oil obtained from the leaves of Melaleuca Cajuputi, *Roxburgh,* (U. S. P.).

Extraction and Commerce.—Rumphius states that the leaves are gathered on a warm day and placed in a sack, where they become hot and damp. They are then macerated in water and left to ferment for a night, and afterwards submitted to distillation. Two sackfuls of the leaves yield only about three fluid drachms of the oil. Lesson, who visited Bouro, one of the Molucca Islands,

in 1823, has thus described the method there adopted for obtaining the oil :—" The leaves are gathered in the latter end of September, and put into the cucurbit of a copper alembic surmounted by a neck, terminated by a capital without a refrigeratory, and a sufficient quantity of water is then added. By distillation this liquid is made to traverse a worm immersed in a hogshead filled with water, and is collected in a vessel." Bickmore, an American traveller, who visited the same island in 1865, also states that the oil is obtained by submitting the leaves to distillation with water, the operation being conducted in the most primitive manner.

Cajuput oil is imported from Singapore and Batavia in glass beer or wine bottles. By far the largest quantity of oil is obtained from Celebes, an island on the west of Bouro in the Molucca Sea ; but some is also imported into Singapore from Java, Manilla, Bouro, and other places.

General Characters and Composition.—Oil of Cajuput or Cajeput is a transparent limpid liquid, of a pale blueish-green colour; a strong, penetrating, agreeable, camphoraceous odour ; and a warm, bitterish, aromatic, camphoraceous taste, succeeded by a sensation of coldness in the mouth. It is very volatile and inflammable. Its specific gravity has been found to vary from 0·914 to 0·930, averaging probably about 0·926 ; it boils at 343°. It is wholly soluble in alcohol. The researches of Schmidt and of Gladstone show that cajuput oil is essentially composed of *Bihydrate of Cajuputene* or *Cajuputol*. *Cajuputene* is a hydrocarbon, and possesses an agreeable odour resembling that of hyacinths.

The remarkable green colour of cajuput oil has been attributed to a salt of copper derived from the vessels in which it is distilled, but neither Brande, Gœrtner, nor Pereira could detect copper in specimens examined by them. Lesson also, who, as already mentioned, witnessed the process for obtaining the oil at Bouro, believed the green colour to be natural to it, and, moreover, Guibourt has proved that the volatile oils obtained by the distillation of the leaves of several other species of *Melaleuca* and of allied plants have naturally a fine green hue.

It is clear, therefore, that the green colour is natural to the oil, but it seems probable that this colour is lost by keeping, and that it is contaminated by copper in order to make the green colour permanent; for whatever may have been the case formerly, it is certain that traces of copper may be usually found in the cajuput oil that is now imported.

Medical Properties and Uses.—Cajuput oil is a diffusible stimulant, antispasmodic and diaphoretic when administered internally; and externally applied it is rubefacient. It is highly esteemed by the Malays and other Eastern races; but it is not much used in this country. It is, however, generally regarded as an efficacious remedy in flatulent colic, hysteria, and painful spasmodic affections of the bowels. As a diffusible stimulant it has likewise proved useful in cases marked by depression of the vital powers, as in low fevers and paralytic affections. In cholera it has been much vaunted as a remedy, but on insufficient grounds. It has also been successfully employed in chronic rheumatism, &c. Externally applied, when mixed with olive oil, it is very serviceable in chronic rheumatism, gouty affections, and in neuralgic and other painful diseases.

Per. Mat. Med., by B. & R., p. 796; Pharmacographia, p. 247; U. S. Disp., by W. & B., p. 593; Trans. Royal Soc. Edin., vol. xii, p. 360; Gmelin's Chemistry, vol. xiv, p. 514; Histed, in Pharm. Journ., vol. ii, 3rd ser., p. 804; Guibourt, Hist. des Drog., vol. iii (1869), p. 278.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum Herbarium collected by Christopher Smith in Amboyna. 1. A small branch with leaves, buds, and flowers. 2. Vertical section of flower, the upper part of stamens removed. 3. A staminal bundle. 4. Transverse section of ovary. 5. Fruit. 6. Vertical section of the same. 7. A seed. 8. Old fruit; the growth of the terminal bud has continued the branch. (2–7 enlarged.)

D. Blair ad. sicc. del. et lith.

M&N. Hanhart imp.

UNCARIA GAMBIR, *Roxb.*

N. Ord. Rubiaceæ. Lindl., Veg. K., p. 761 (Cinchonaceæ); Le Maout & Dec., p. 483.

Tribe *Naucleeæ*.

Genus Uncaria,* *Schreb.* B. & H., Gen., ii, p. 31. Species 30, all tropical, one African, another South American, the rest Indian.

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139. Uncaria Gambier,† *Roxburgh, Fl. Ind.*, i, *p.* 517 (1832).

Syn.—Nauclea Gambir, *Hunter.*

Figures.—Trans. Linn. Soc. Lond., ix, t. 22, cop. in Hayne, x, t. 3, and Nees, Supp.; Berg, Charact., f. 340; Rumph., Herb. Amboyn., v, t. 34, f. 2, 3; Korthals, Verhandl. Natuur. Gesch. Nederlansch. Bezitt., 1839–42, Bot., t. 34.

Description.—A strong, shrubby climber; stems rather slender, slightly thickened at the nodes, cylindrical or somewhat angular, smooth. Leaves opposite, stalked, readily disarticulating; stipules two at each node, interpetiolar, ovate or oblong, entire, blunt, early caducous, leaving a linear scar after falling; blade 3 or 4 inches long, ovate or oblong-ovate, rounded at the base, suddenly narrowed into the attenuate apex, entire or with a very few wide crenatures, smooth on both surfaces. Flowers small, closely crowded on small, globular, hairy receptacles at the extremity of axillary peduncles about an inch long and of singular structure; these are smooth, laterally compressed, and taper from a broad base in their lower half; half way they are provided with a cup-like whorl of small bracts, and beyond this become slender, cylindrical, and finely silky; at the whorl of bracts is an articulation, and after the fall of the whole inflorescence at this point the broad lower portions become elongated, very hard, and curved into hooks, by which the plant climbs. Calyx woolly or silky, the tube united with the ovary, the limb divided into 5 lanceolate or triangular teeth. Corolla monopetalous, with a slender tube ½ inch long, widening upwards, and terminating in an open cup with 5 broadly

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* Name from *uncus*, hooked, in reference to the falcate peduncles.

† *Gambir* is the Malay name of the extract.

ovate segments, hairy externally, and with a tuft of hairs at the base of each segment within. Stamens 5, inserted in the throat of the corolla, filaments excessively short, anthers long, 2-celled, with pointed bases. Ovary inferior, 2-celled, style very long, protruding much beyond the mouth of the corolla and ending in a club-shaped stigma. Fruit about 1 inch long, on a long stalk, narrow-ovoid, tapering at each end, pericarp dry, splitting into two layers when ripe, and dehiscing vertically into two valves, the valves of the outer layer remaining attached at the apex. Seeds very numerous, minute, pale brown, rough, with a long, transparent tail at each end, one split almost to the base, the other entire.

Habitat.—This shrub is found in the Island of Pulo Penang, and other districts about the Straits of Malacca, also in Sumatra and in Ceylon, and is now cultivated in numerous and extensive plantations in the neighbourhood of Singapore. It appears that the curious axillary hooks are frequently produced without bearing any heads of flowers.

U. acida, Roxb., is figured in Berg and Sch., t. 33 e; it is said to differ from *U. Gambier* in possessing a more angular stem, deeply bifid stipules, and an acid taste in the leaves, and is also found at Pulo Penang. Probably it may be reduced to a variety of the species under notice.

Hunter, in Trans. Linn. Soc., ix (1808), p. 218; DC. Prod., iv, p. 347; Roxburgh, Fl. Indica, i, p. 517; Lindl., Fl. Med., p. 405.

Official Part and Name.—Catechu Pallidum; an extract of the leaves and young shoots (B. P.). An extract obtained from the leaves and young shoots (I. P.). Not official in the Pharmacopœia of the United States.

Uncaria acida, *Roxb.*, appears also to be used in the preparation of *Catechu pallidum*, but it is not official.

Commercial Kinds of Catechu.—The term *Catechu* is applied to various astringent extracts, of which the following three are more especially known in commerce :—1. *Gambier*, the one now to be described under the official name of *Catechu pallidum*; 2. *Cutch*,

Catechu of the Acacia Catechu, or *Catechu nigrum*, which is noticed under *Acacia Catechu*; and, 3. *Ceylon Catechu* or *Betel-nut Catechu*, which is described under *Areca Catechu*.

Preparation of Catechu Pallidum.—The Gambier or Gambir plant is largely cultivated at Singapore and in the Island of Bintang and other islands lying south-east of Singapore; and also to some extent in other parts. Gambier is prepared by boiling the leaves and young shoots in water until all their astringency is extracted; the decoction is then said to be evaporated to the consistence of a thin syrup, and put into buckets, and when sufficiently cool stirred in the following manner:—The workman pushes a piece of soft wood in a sloping direction into each bucket; and with two buckets before him he works a stick up and down in each. "The liquid thickens round the stick, and the thickened portion being constantly rubbed off, while at the same time the whole is in motion, it gradually sets into a mass, a result which, the workman affirms, would never be produced by simple stirring round." The thickened mass, which is described by Mr. Bennett as being of a light yellowish-brown colour, like clay, is now placed in shallow square boxes, and when sufficiently hardened is cut into cubes and dried in the shade. The process adopted is given somewhat differently by others; but in all cases the preparation is said to be conducted with the simplest apparatus.

Commerce.—Gambier is principally obtained from Singapore, from which port alone 37,352 tons were exported in 1872, of which about 25,000 tons were imported into Great Britain, representing a money value of about £450,000. It is also largely imported into the United States.

General Characters and Composition.—Gambier, Gambir, Pale Catechu, or *Terra Japonica*, under all of which names it is known, occurs in cubes, or in masses of variable size formed of more or less agglutinated cubes, or rarely, in quite compact masses. The separate cubes are about an inch square on each side, of a deep reddish-brown colour externally, and of a pale cinnamon-brown hue internally. They are dry and friable, and their fractured surface presents a dull, porous, earthy appearance, and hence,

under the impression originally that catechu was an earthy substance derived from Japan, it was called *terra japonica.* Catechu has no odour; its taste at first is bitter and very astringent, but subsequently sweetish. Under the microscope catechu is found to consist mainly of myriads of very small acicular crystals of *Catechin* or *Catechuic Acid.* It is entirely soluble in boiling water, and its decoction when cool is not rendered blue by iodine, indicating the absence of starch.

Pale Catechu has essentially the same composition as Cutch or Black Catechu from *Acacia Catechu;* thus, it mainly consists of *Catechin* or *Catechuic Acid,* and *Catechu-tannic Acid.* Like Cutch, Pale Catechu also contains a yellowish colouring matter, which has been named *Quercetin.*

Several other varieties of pale catechu have been described by Pereira and other pharmacologists, but they are generally more or less impure, and should not be used in medicine. They are now, moreover, but rarely imported.

Medical Properties and Uses.—Pale Catechu is especially valuable as an astringent. Its properties are similar to the Catechu obtained from *Acacia Catechu,* which is, however, preferred in the United States; but Pale Catechu is alone official in this country, and is also more commonly used in India. It is more readily soluble than that from *Acacia Catechu;* and is more powerful than kino. Pale Catechu is a valuable remedy in chronic diarrhœa and dysentery, in which cases it may be advantageously combined with opiates and chalk mixture. It may be also used in passive uterine hæmorrhages, and generally in mucous discharges. When chewed, or taken in the form of a lozenge, it is an excellent remedy in relaxed conditions of the uvula and palate, and for hoarseness in public speakers and singers. As a topical astringent it may be also applied in the form of an ointment to ulcers; and it is frequently very useful as an injection in bleeding of the nose and in leucorrhœa, &c.

Pale Catechu is also largely consumed in the East by the Betel-chewers, as it forms one of the ingredients in the famed masticatory called *Betel.*

By very far the largest consumption, however, of pale catechu is in tanning, dyeing, &c.

Per. Mat. Med., vol. ii, pt. 2, p. 152; Pharmacographia, p. 299; U. S. Disp., by W. & B., p. 242; Watts' Dict. Chem., vol. i, p. 816; Per. Mat. Med., by B. & R., p. 749; Collingwood, Journ. of Linn. Soc. Bot., vol. x (1869), p. 52; Garr., Mat. Med., p. 287; Pharm. Journ., 2nd ser., vol. vi (1865), p. 18.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum collected at Malacca by Maingay (no. 827), and in Ceylon by Thwaites (no. 1661).

1. A flowering branch.
2. A flower.
3. Upper part of corolla laid open.
4. Stamens.
5. Vertical, and—6. Transverse section of ovary.
7. Fruit.
8. Seed.
9. Extremity of a young twig to show stipules.
10. The hooked peduncles after the fruit has fallen.

D. Blair ad. sicc. del. et lith.

M&N Hanhart

CHIMAPHILA UMBELLATA, *Nuttall.*

N. Ord. Ericaceæ.

Tribe *Pyroleæ*.

Genus Chimaphila,* *Pursh*. DC. Prod., vii, pp. 775. Species 3, natives of the northern parts of both hemispheres.

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165. Chimaphila corymbosa, *Pursh, Fl. Am. Sept.*, i, *p.* 300 (1814).

Winter-green. Pipsissewa. Princes Pine.

Syn.—Pyrola umbellata, *Linn.* Chimaphila umbellata, *Nuttall* (1818).

Figures.—Barton, i, t. 1; Bigelow, ii, t. 21; Steph. & Ch., t. 93; Woodville, vol. v; Hayne, xiii, t. 13; Fl. Danica, t. 1336; Bot. Mag., t. 778; Nees, Gen. Fl. Germ.; Schnitzlein, Iconogr., t. 161.

Description.—A sub-herbaceous or slightly woody perennial, with long running semi-subterranean shoots and ascending stems 4—10 inches high. Leaves evergreen, arranged in 1—5 irregular whorls which are closely placed on the short stem, very shortly stalked, lanceolate or obovate-lanceolate, tapering at the base, acute, serrate, thick, convex and glossy above, paler below. Flowers 4—8, forming a small terminal umbel or corymb, nodding on longish stalks, pedicels with narrow small bracts about the middle. Calyx small, with 5 blunt divisions, persistent. Petals 5, much longer than the calyx, rounded, concave, flesh-coloured. Stamens 10, hypogynous, free; filaments with a double curve, convex fleshy and much dilated with a fringed margin in their lower half, concave and filiform in the upper half; anthers violet-coloured, 2-celled, attached by their middle, opening by two round orifices at the narrow somewhat horned base, which, by a tilting-up movement of the filaments, becomes the apparent apex. Carpels 5; ovaries slightly connected laterally, arranged round the large conical spongy receptacle, walls thin, ovules very numerous, placed all over the large axile placentas; style very short, obversely conical, nearly immersed in

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* Name from χεῖμα, winter, and φιλεῖν, to love, a translation of "winter green."

the cavity between the ovaries; stigma large, convex, faintly 5-lobed. Fruit a 5-celled globular capsule on an erect stalk, with thin pericarp dehiscing loculicidally. Seeds minute, very numerous, with a loose transparent cellular coat.

Habitat.—This pretty plant is not uncommon in dry woods throughout the north of Europe, reaching southward to Switzerland and South Germany, but more abundant in Scandinavia and Russia and extending into Siberia. It does not occur in Britain or Western Europe. In North America it is common, extending from Northern Canada to N. Carolina. It does not seem to be now in cultivation in our botanic gardens, but was formerly to be met with, having been introduced at Kew so far back as 1762. The main characters distinguishing *Chimaphila* from *Pyrola* are the dilated base of the filaments and the absence of any connecting web between the valves of the capsule, points hardly sufficient perhaps to warrant a generic separation.

DC. Prod., vii, p. 775; Hook., Fl. Bor. Am., ii, p. 49; A. Gray, Fl. U. States, p. 303; Chapman, Fl. South. States, p. 267; Lindl., Fl. Med., p. 375.

Official Part and Names.—CHIMAPHILA, *Pipsissewa;* the leaves (U. S. P.). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

General Characters and Composition.—These leaves are somewhat lanceolate in outline, but broadest at their apex, and wedge-shaped at the base; and have a uniform shining green colour. These characters will distinguish them from the leaves of an allied species—*Chimaphila maculata,* or *Spotted Winter Green,* which are similar in outline, but rounded at the base and broader at that point than at their summit, and have a deep olive-green colour with greenish-white veins. When fresh and bruised they have a peculiar odour, but this is lost when they are dried, as in those of commerce; their taste is pleasantly bitter, astringent, and sweetish. Their infusion is rendered green by a solution of the perchloride of iron.

The leaves are alone official in the Pharmacopœia of the United

States, but all parts of the plant have active properties, and the leaves and stems are kept in the shops and frequently used together. The stem and root have a pungent taste combined with bitterness and astringency.

The more important constituents of Chimaphila are *tannic acid, resin, bitter extractive,* and a peculiar crystalline neutral principle which has been called by Fairbank *Chimaphilin.*

Medical Properties and Uses.—Chimaphila possesses mild tonic, astringent, and diuretic properties. It resembles Uva Ursi in its action, but is less astringent than it. It has been used in dropsies combined with great debility and loss of appetite; in chronic diseases of the urinary organs, as cystirrhœa and calculous complaints; and also in gonorrhœa, hæmaturia, &c. In the United States it has been regarded as more especially valuable in scrofula, from which circumstance it has even acquired the title of "King's Cure" in some of the States. Besides its use internally in scrofula, it has also been employed locally as a wash, in the form of a decoction, to unhealthy scrofulous sores.

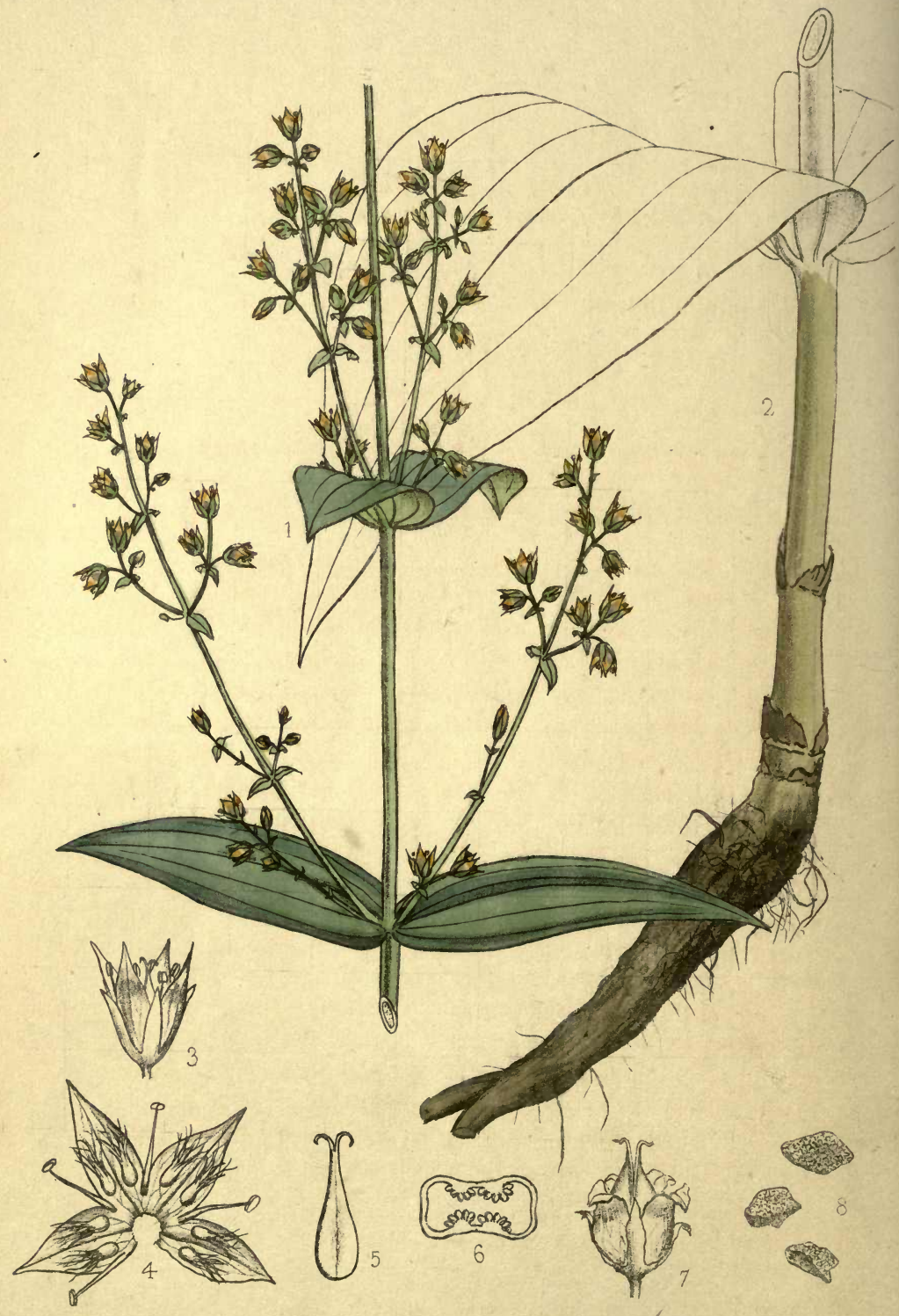
Per. Mat. Med., by B. & R., p. 673; U. S. Disp., by W. & B., p. 256; Steph. & Church., Med. Bot., by Burnett, vol. ii, pl. 93; Fairbank, in Journ. and Trans. of the Md. Col. of Pharm., U. S., March, 1860; Somerville, in Trans. Med.-Chir. Soc. Lond., vol. v, p. 340; Paris's Pharmacologia.

DESCRIPTION OF PLATE.

The flowering plant drawn from a specimen collected in Sweden, the fruit from one collected in the Rocky Mountains, both in the British Museum.

1. A flowering stem.
2. A flower.
3. Diagram of flower.
4. Vertical section of same.
5. Transverse section of ovary.
6. Stamen with the anther in two positions.
7. A specimen in fruit.
8. A capsule.
9. A seed.

(2–6, 8 enlarged; 9 greatly magnified.)



D.Blair ad sicc del et lith.

M&N Hanhart imp

OPHELIA CHIRATA, *Grisebach.*

N. Ord. GENTIANACEÆ.

Tribe *Swertieæ*.

Genus Ophelia,* *Don.* DC. Prod., ix, pp. 123–7. Species 18 or 20, natives of India, and a few in China and Australia.

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183. Ophelia Chirata,† *Grisebach, Gen. & Spec. Gent., p.* 320 (1839).

Chiretta. Chirayta.

Syn.—Gentiana Chirayita, *Roxb.* G. floribunda, *Don.* Ophelia lurida, *Don.* Agathotes Chirayta, *Don.*

Figures.—Wallich, Plant. Asiat. Rar., iii, t. 252.

Description.—A large annual (?) herb, reaching 5 feet in height, with a thick, tapering, scarcely branched root. Stem erect, branched in the upper part, stiff, smooth, cylindrical below, bluntly quadrangular above, slightly thickened at the nodes, with a very large pith, often hollow in the lower part. Leaves ovate or ovate-lanceolate, opposite, sessile, smooth, rounded, and semi-amplexicaul at the base, acuminate at the apex, the largest 4 inches long, very much smaller on the branches, with 5 or 7 parallel curved nerves prominent below. Inflorescence consisting of numerous small axillary, opposite, lax cymes (often reduced to a single flower) arranged on the short branches and the termination of the stem, the whole forming an elongated tapering panicle 2 feet in length; flowers small, stalked. Calyx deeply divided into 4 linear acute segments, smooth. Corolla nearly twice as long as the calyx, divided nearly to the base into 4 ovate-lanceolate, strongly acuminate, erect segments, each provided on the upper surface with a pair of "nectaries" covered by pouch-like, oblong scales which terminate in long fringes, persistent. Stamens 4, shorter than the corolla, and inserted at its base, filaments tapering. Pistil of two carpels, ovary compressed, one-celled, tapering into

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* Name from ὀφέλλειν, to bless, from its valuable properties.

† The Kirâtas are "an outcast race of mountaineers in the north of India," among whom this plant was used.

the short style which terminates in two slender recurved stigmas, ovules numerous, inserted on two double (sutural) parietal placentas. Fruit a small one-celled capsule, pericarp transparent, yellowish, dehiscing from above septicidally into two valves. Seeds very numerous, minute, many-sided, angular, testa pitted, embryo very small in fleshy endosperm.

Habitat.—This species is found in the mountainous parts of North India, Sikkim, Kumaon, Khasia, and especially Nepal, at an altitude of 5000—9000 feet. It may be readily distinguished from the other species, many of which have a strong superficial resemblance, by its minute seeds, tetramerous flowers, and double nectaries. The size of the corolla varies, and is sometimes scarcely longer than the calyx; it also presents some difference in colour, being described as yellow, greenish, or purplish, or as combining these colours, by different authors. Wallich's figure above quoted is probably this species, but the characteristic nectaries are entirely omitted. The plant is not yet in cultivation in this country.

Roxb., Fl. Indica, ii, p. 71; Grisebach, in DC. Prod., ix, p. 127; C. B. Clarke, in Journ. Linn. Soc. Lond., xiv, p. 447; Lindl., Fl. Medica, p. 519.

Official Part and Names.—CHIRATA; the entire plant (B. P.). The entire plant (*Chirata, Chiretta*), collected when the fruit begins to form (I. P.). CHIRETTA; the herb and root of Agathotes Chirayta, *Don*, (U. S. P.).

Collection, General Characters, and Composition.—The entire plant is collected about the time the flowers begin to decay, or rather when the fruit begins to form; it is then commonly tied up with a slip of bamboo into flattish bundles, each of which is about 3 feet long, and from 1½ to 2 lbs. in weight. The stems have an orange-brown or purplish colour, and an average thickness of that of a goose-quill; the roots are usually simple and tapering, and from 2 to 4 inches long, and frequently half an inch thick. The stems are rounded below and throughout nearly their whole length, and very faintly quadrangular above, and are branched in a decussate

manner. A transverse section of the stem exhibits a thin woody ring, enclosing a large continuous easily separable pith, which is yellowish in colour. The whole plant is intensely bitter, but has no odour.

The analysis of Höhn shows that Chiretta contains two bitter principles, which he has named *Ophelic acid* and *Chiratin;* and also a tasteless, yellow, crystalline substance, which he obtained in too small a quantity for a thorough investigation.

Substitutes.—In the Indian bazaars several other plants are known by the name of *Chiretta* or *Chirayta,* besides the true drug, and possess to a greater or less degree its bitter tonic properties. Thus, *Ophelia angustifolia,* Don, *O. elegans,* Wight, *O. densifolia,* Griseb., and *O. multiflora,* Dalzell; *Exacum tetragonum,* Roxb., *E. bicolor,* Roxb., and *E. pedunculatum,* Linn.; and *Slevogtia orientalis,* Griseb., all of which are Gentianaceous plants, are so characterised; as also *Andrographis* (*Justicia*) *paniculata,* Wall., of the natural order Acanthaceæ, which is described in its proper place, is so designated. It is, therefore, somewhat remarkable, considering the number of substitutes for the true Chiretta, which are thus known in India, that some of them should not have found their way, accidentally or intentionally, into other parts of the world; but none such have been described until one of us noticed at the end of the year 1874, the substitution of the plant of *Ophelia angustifolia,* Don, which is called in India *Puharee* (hill) *Chiretta,* for that of the true Chiretta, and the substitution is still to be found in this country. This spurious Chiretta may be readily distinguished from that of the true drug by the far less bitter taste of its infusion; by its stems being evidently quadrangular and somewhat winged throughout their whole length; and by their transverse section exhibiting a thick woody ring on the outside, and with the centre hollow or presenting but faint traces of pith.

Medical Properties and Uses.—Chiretta is highly valued in India as a powerful and pure bitter tonic, without aroma or astringency; but it is comparatively little used in this country, and but very slightly so on the Continent, and in the United States. It is, however, more bitter than Gentian, and may be employed in

similar cases to it. It is reputed to be especially serviceable in the dyspepsia of gouty subjects. It is sometimes employed instead of Gentian to impart flavour, &c., to cattle foods.

Pharmacographia, p. 392; U. S. Disp., by W. & B., p. 258; Pharm. of India, p. 149; Royle's Bot. of the Himalayan Mountains, p. 277; Archiv der Pharmacie, 189 (1869), p. 229; Bentley, in Pharm. Journ., vol. v, 3rd ser., p. 481.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum collected in Nepal by Wallich (no. 4372 B).

1. Portion of flowering panicle.
2. Lower part of stem, with root.
3. A flower.
4. Corolla spread open.
5. Pistil.
6. Transverse section of ovary.
7. Fruit, showing persistent corolla.
8. Seeds.

(3–7 enlarged; 8 much magnified.)

SCHŒNOCAULON OFFICINALE, *A. Gray*

N. Ord. MELANTHACEÆ.

Tribe *Veratreæ*.

Genus Schœnocaulon,* *A. Gray*. Species 3, all found in southern North America.

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287. Schœnocaulon officinale, *A. Gray in Benth. Plant. Hartweg., p.* 29 (1839).

Sabadilla. Cevadilla.

Syn.—Melanthium Sabadilla, *Thunb.* Veratrum officinale, *Schlecht.* Helonias officinalis, *Don.* Sabadilla officinarum, *Brandt.* Asagræa † officinalis, *Lindl.*

Figures.—Nees, Supp.; Hayne, xiii, t. 27; Berg & Sch., t. 9 e; Bot. Reg., xxv (1839), t. 33.

Description.—A bulbous herb, the small ovoid bulb covered with numerous thin, black scales, and the scape reaching 5 feet or more in height. Leaves all from the bulb, linear, grass-like, 1½—4 feet long, smooth, entire, gradually tapering, keeled with a strong midrib. Scape slender, cylindrical, or somewhat angular, smooth, quite simple. Inflorescence a moderately dense, very narrow, spike-like raceme, 9—18 inches long, pedicels short, with small bracts at the base, flowers very numerous, scarcely $\frac{3}{8}$ inch wide, those in the lower part of the inflorescence hermaphrodite, those in the upper part staminate and sterile. Perianth-leaves 6, spreading in two whorls, the outer 3 slightly larger, strap-shaped, blunt, thick, greenish-yellow, hollowed and nectariferous at the base. Stamens 6, hypogynous, opposite the leaves of the perianth and longer than them, very slightly adherent to their base, filaments flat, anthers large, reniform, yellow, the cells confluent, dehiscing along the top. Carpels 3, superior, erect, shorter than the stamens, in contact by their ventral sutures, each with several (6—8) ascending ovules, styles slender, slightly combined at the base, curved

* Name from σχοῖνος, a rush, and καυλός, a stem, from the habit of its scape.

† *Asagræa* was given in commemoration of Prof. Asa Gray, of Harvard University, the most distinguished of living American botanists.

outwards; in the barren flowers the carpels are rudimentary. Fruit composed of three dry follicles about ½ inch long, surrounded at the base by the withered perianth and slightly spreading at the top; pericarp pale brown, papery, dehiscing down the ventral suture. Seeds (often abortive) 2—5 in each follicle, dark brown, fusiform, somewhat compressed, prolonged above into a membranous wing; embryo very small, immersed in copious endosperm at the base near the hilum.

Habitat.—The Sabadilla is found in grassy places on open hills in Mexico, Guatemala, and Venezuela. The plant found in the neighbourhood of Caracas has somewhat broader and more distinctly carinate leaves, but can scarcely be held to constitute a different species. *Sabadilla* and *Schœnocaulon* differ only in the former having polygamous flowers, and the two genera may be, therefore, combined with propriety. The date of both names is 1837 (the latter genus having been founded on *S. gracile*), so that we are free to adopt either.

Veratrum Sabadilla, Retzius, Obs. Bot., i, p. 31 (1779), is also a source of Sabadilla, having been originally described from a raceme of flowers picked out from among the drug. They were polygamous, with purplish-black, ovate perianth leaves. Descourtilz gives a full description of a West Indian plant under the same name with a figure which is reproduced in Nees, t. 48, and represents a true *Veratrum*. Mr. Baker is inclined to refer it to the common European *V. nigrum*, L. The plant, however, is not known in our herbaria (see Roem. and Schultes' Syst., vii, p. 1558, Lindl. Fl. Med., p. 586, Kunth, Enum. iv, p. 188, Flück. and Hanb., Pharmac., p. 634, note).

Kunth, Enum. Plant, iv, p. 184; Ernst, in Journ. Bot., ix, p. 91; Lindl., Fl. Med., p. 586.

Official Parts and Names.—SABADILLA; the dried fruit of Asagræa officinalis, *Lindl.* (B. P.). The seeds (*Sabadillæ Semina*) of Asagræa officinalis (I. P.). SABADILLA; the seeds of Veratrum Sabadilla, *Retzius*, (U. S. P.).

Commerce, General Characters, and Composition.—It seems probable that the Sabadilla, Cevadilla, or Cebadilla of commerce,

may be obtained from more than one plant. The dried fruit was formerly alone imported from Vera Cruz, being the produce of plants cultivated in Mexico; but of late years, as stated by Ernst, the seeds are now alone shipped in large quantities from La Guayra, the port of Caracas.

Each fruit, as found in commerce, is about half an inch long, and is surrounded at its base by the remains of the perianth, and attached to a short stalk; it consists of three light brown, oblong, pointed carpels (*follicles*), of a papery texture. The carpels are united at their base, but separated above, and open on their inner or ventral suture. Each carpel contains from one to three or more seeds, usually two, which are about $\frac{3}{10}$ of an inch in length, narrow, pointed, somewhat scimitar-shaped and winged, shining, corrugated, of a blackish-brown colour, an acrid bitter taste, and without odour, but when powdered producing violent sneezing. In commercial specimens the carpels are frequently found without any contained seeds, these having fallen out, and may be seen lying in a loose state mixed with the empty carpels.

Cevadilla owes its properties essentially to the alkaloid *veratria*, but it is still doubtful whether this alkaloid is confined to the seeds, or whether it is likewise contained in the pericarp. Veratria is said to be combined with gallic acid. As seen in commerce, and used in medicine, veratria is always in an amorphous powder, but when pure it is in long acicular crystals. Veratria in a pure state is nearly insoluble in water, but readily soluble in alcohol, ether, and chloroform. It has no odour, but if inhaled it produces violent sneezing; its taste is persistently and strongly bitter, and highly acrid.

Two other alkaloids have been also discovered in Sabadilla, one crystallizable and called *sabadilline*, and the other uncrystallizable, and to which the name of *sabatrine* has been given. The former is always present in commercial veratria; it may be distinguished from it by being insoluble in ether, and by not causing sneezing. Sabatrine is also said to be contained in the veratria of commerce.

Medical Properties and Uses.—Cevadilla can scarcely be said to be in use at the present time in itself as a medicinal agent, although

it was formerly employed internally as an anthelmintic, and in rheumatic and neuralgic affections; and externally for destroying pediculi. It is official in the pharmacopœias as the source of veratria, which is of a highly poisonous nature, but it has been employed in very minute doses internally in acute rheumatism and gout; as an antiphlogistic in some inflammatory diseases; and in other cases; but it is a very dangerous remedy for internal use. For external application, however, in the form of an ointment, veratria has been found very useful in rheumatism, neuralgia, and other painful affections, but it is not generally regarded as so valuable as aconitia when used in the same form, and in like cases. The ointment is also employed for the destruction of pediculi.

Per. Mat. Med., by B. & R., p. 422; Pharmacographia, p. 633; U. S. Disp., by W. & B., pp. 750 and 1497; Garr., Mat. Med., p. 384; Wigger's and Husemann's Jahresbericht for 1871, p. 24; Journ. de Pharm., vol. xiv, p. 527; Amer. Journ. of Pharm., vol. xxv, p. 133.

DESCRIPTION OF PLATE.

Drawn from a specimen collected by Ernst in Venezuela (no. 219), in the British Museum. The fruit added from the commercial drug.

1. A sterile flower.
2. Anthers.
3. A fertile hermaphrodite flower.
4. Perianth segments.
5. Transverse section of ovaries.
6. Vertical section of a carpel.
7. Part of raceme of fruit.
8. A single fruit.
9. Seed.
10. Section of the same.

(1–6, 9, 10 enlarged.)

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D.Blair ad viv. del.t et lith.

M & N.Hanhart imp.

ALTHÆA OFFICINALIS, L.

N. Ord. MALVACEÆ. Lindl., Veg. K., p. 368; Baill., Hist. Pl., iv; Le Maout & Dec., p. 279.

Tribe *Malveæ*.

Genus Althæa,* *Linn.* B. & H., Gen., i, p. 200; Baill., l. c., p. 138. About 12 species, natives of the temperate and warmer regions of the northern hemisphere.

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35. Althæa officinalis, *Linn., Sp. Pl. ed.* i, *p.* 686 (1753).

Marsh Mallow.

Figures.—Woodville, t. 198; Hayne, ii, t. 25; Steph. & Ch., t. 51; Nees, t. 417; Berg & Sch., t. 21 f; Syme, E. Bot., ii, t. 278.

Description.—A perennial herb with numerous stems springing from a large, thick, elongated, tough, fleshy, yellowish-white, tapering root-stock, reaching a foot in length. Stems erect, stiff, 2—4 feet high, unbranched or nearly so, cylindrical, covered with a very dense, velvety pubescence of stellate hairs. Leaves alternate on rather long stalks, 1½—3 inches long, the lower ones roundish-ovate, the upper triangular-oval, or somewhat 3- or 5-lobed, irregularly cut, acute, serrate, rather thick, plaited, velvety on both sides with a close felt-like pubescence, and some longer hairs on the veins, pale greyish-green; stipules narrowly triangular, quickly caducous. Flowers in small axillary clusters of 2—4 or solitary, shortly stalked, forming at the end of the stem narrow leafy panicles. Involucre (epicalyx) with 7—10 subulate-triangular erect segments. Calyx deeply divided into 5 narrowly triangular acute segments, about twice the length of the involucre, densely pubescent, persistent. Corolla cup-shaped, varying from 1 to 2 inches across, of 5 obcordate wedge-shaped and truncate petals coherent by their narrow bases, pale purplish-rose-coloured, finely veined, twisted in the bud. Stamens numerous, monadelphous, the filaments combined in their lower portion to form a thick hollow tube, united at the base with the corolla, anthers drooping,

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* Althæa, ἀλθαία, Dioscorides, from ἄλθειν, to heal.

reniform, 1-celled, dark purple, flat after dehiscence. Ovary covered by the base of the combined petals and staminal tube, roundish, flattened, with numerous cells, and a single ovule in each, style cylindrical, tapering, passing through the staminal tube, and dividing beyond it into numerous slender filiform branches with the stigmatic surfaces on the inside. Fruit brownish-green, flattened-spherical, partially covered by the closely inflexed persistent sepals, consisting of a radiating whorl of numerous dry, laterally compressed, circular, indehiscent carpels (cocci) attached to a central axis, smooth on the flat sides, hairy on the back, separating from each other when ripe. Seed kidney-shaped, smooth, brown; embryo curved, with thin cotyledons, endosperm almost absent.

Habitat.—The marsh mallow grows in ditches and wet places in the neighbourhood of the sea and tidal rivers throughout Europe, with the exception of Scandinavia and North Russia; also in Asia Minor, Western Asia (reaching Kashmir), and Algeria. In England it can be scarcely called common, but is to be found in most of the southern counties in suitable situations. Further north in this country it is considered to be introduced or escaped from cultivation, as is also the case in Norway and in the United States. It grows very readily in inland gardens, but loses there a good deal of the characteristic grey velvet-like covering and becomes greener. For medicinal use it is cultivated chiefly in Bavaria and Wurtemberg.

Syme, E. Bot., ii, p. 163; Hook. f., Stud. Fl., p. 71; Watson, Comp. Cyb. Brit., p. 128; Fl. Brit. India, i, p. 319; Boissier, Fl. Orient., i, p. 428; Gren. & Godr., Fl. France, i, 494; Lindl., Fl. Med., p. 143.

Official Part and Name.—ALTHÆA; the root (U. S. P.). Not official in the British Pharmacopœia, or the Pharmacopœia of India.

Collection.—Marsh mallow roots are usually collected in the autumn from cultivated plants of two years old; they are then scraped so as to remove the outer portions of the bark and the

small root branches; and are finally dried, in which condition they are commonly found in commerce. Sometimes the roots are simply washed, after which their branches are removed, and they are then dried without being scraped; but the former mode of preparation is generally preferred.

General Characters and Composition.—Marsh mallow root as prepared by scraping, is in straight, somewhat cylindrical or tapering, unbranched pieces, from about 6 to 8 inches long, and varying in thickness from that of a quill to the middle finger. It has a whitish colour externally, is deeply furrowed longitudinally, and its surface is covered by short soft projecting fibres. When cut transversely it is seen to consist of a central white woody column, which is separated by a dark wavy ring from a thick bark. The central portion breaks short, but the bark has a tough fibrous fracture. It has a feeble peculiar odour, and a mild, mucilaginous, somewhat sweetish taste.

The *unscraped root* has a yellowish-brown colour externally, and its surface is not covered with fibres; but in other respects its characters are essentially the same as those of the scraped root.

The principal constituents of marsh mallow root are *mucilage, starch, sugar,* and a neutral inert crystalline substance, called *asparagin,* which is found in various other plants besides the marsh mallow, as the asparagus, liquorice, &c. Its medical properties are essentially due to the mucilage.

Medical Properties and Uses.—Marsh mallow root is demulcent and emollient. It is but little used in this country, but on the continent it is a very favourite remedy. It is employed internally as a demulcent in inflammatory affections of the alimentary canal, and of the pulmonary and urinary organs; and externally as an emollient poultice and fomentation to inflammatory and abraded surfaces, &c. A favourite preparation in France is the *pâte de guimauve.* In France the powdered root is also much used in the preparation of pills, &c.

Per. Mat. Med., vol. ii, pt. 2, p. 555; Pharmacographia, p. 85; U. S. Disp., by W. & B., p. 97; Journ. de Pharm., vol. xix, p. 208.

DESCRIPTION OF PLATE.

Drawn from a plant cultivated in the garden of the Apothecaries' Company at Chelsea.

1. A plant, reduced.
2. Upper part of a flowering stem.
3. Vertical section of a flower.
4. Calyx and involucre.
5. Ripe fruit.
7. Seed.
8. Section of the same.

(3, 4, 6–8 enlarged.)

D.Blair ad sicc delt et lith.

M & N.Hanhart imp

BALSAMODENDRUM OPOBALSAMUM, *Linn.*

N. Ord. BURSERACEÆ.

Tribe *Bursereæ*.

Genus **Balsamodendrum**,* *Kunth.* B. & H., Gen., i, p. 323 (and *Hemprichia*, p. 327); Berg, in Bot. Zeitung, 1862, p. 153; Baill., Hist., v, p. 310 (*Balsamea*, Gled. Includes *Protium*, W. & A.). About 15 species have been described, natives of sub-tropical and tropical Africa, Arabia, and Western India.

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59. Balsamodendrum Opobalsamum,† *Kunth, in Ann. Sc. Nat., ser.* 1, ii, *p.* 348 (1823).

Balessan, Bechan (Arabia). *Balm of Gilead. Balsam-Tree.*

Syn.—Amyris gileadensis *and* A. Opobalsamum, *Linn.* Balsamodendrum gileadense, *Kunth.* Balsamodendron Ehrenbergianum, *Berg.* Protium gileadense, *Lindl.* non *W. & A.* Balsamea Opobalsamum, *Baillon.*

Figures.—Bruce, Travels (1790), Appendix, 2nd and 3rd plates; Woodville, t. 214, cop. in Steph. & Ch., t. 157; Nees, t. 356; Berg & Sch., t. 29 d (*B. Ehrenbergianum*); Baill., l. c., f. 277–279.

Description.—A shrub or small spreading tree, 10—12 feet high, with long, slender, wand-like, irregular branches, without spines; bark smooth, striate, orange- or purplish-brown, the outer layers peeling off on the old stems; the twigs irregularly set with short, wart-like branchlets, closely marked with leaf-scars, and producing at their extremities the leaves and flowers. Leaves usually scanty, in fascicles of 2—6 from the extremities of the rudimentary branchlets, generally about an inch long including the long, slender petiole, trifoliolate; on the young shoots of the year alternate, with long internodes, often pinnately 5-foliolate; leaflets scarcely ½ inch long, sessile, narrowly oval or obovate, acute, entire, thin, veined beneath, pale glaucous green, usually quite glabrous, sometimes densely pubescent on both sides, the terminal one the largest. Flowers imperfectly dicœcious, on short pedicels jointed to

* The *βαλσάμου δένδρον* of Theophrastus.

† *Opobalsamum*, *ὀποβάλσαμον* in Dioscorides, the juice flowing from the Balsam-tree.

longer peduncles, which are solitary or 2—3 together at the extremities of the stunted branches, with several small, ovate bracts at the forks, whole inflorescence shorter than the leaf-petiole. Calyx cup-shaped, smooth, persistent, with 4 faint distant teeth or shallow lobes. Petals 4, alternating with the calyx-teeth, oblong, acute, erect, reddish, valvate in the bud. Male flowers :—stamens 8, hypogynous, inserted beneath a ring-shaped hypogynous disk surrounding the rudimentary ovary, about as long as petals, the alternate 4 often shorter, anthers large, 2-celled; pistil rudimentary. Female flowers:—stamens usually 4, about half as long as the petals, disk small; ovary longer than the stamens, ovoid, tapering, 2-celled, with 2 axile ovules in each cell, stigma large, capitate. Fruit slightly compressed, ovoid or somewhat pyriform, apiculate, about $\frac{3}{8}$ inch long, stalked, surrounded at the base by the persistent calyx, glabrous, epicarp leathery, ultimately dehiscing into 2 or partially into 4 boat-shaped valves, mesocarp (?) yellowish-white, pulpy, irregularly cup-shaped, and extending up the pyrenes on 4 sides, but not covering them, fertile pyrene very hard, black, containing a single seed, with the fibrous, cord-like axis of the fruit running up between it and the other scale-like, adpressed, abortive pyrene and attached to the top of both. Seed solitary, grooved down one side, testa thin, yellow; embryo large with plaited cotyledons, and a short, thick, superior radicle; no endosperm.

Habitat.—This species of *Balsamodendrum* appears to have a somewhat extensive range on both sides of the Red Sea, south of 22° north latitude, and is in many places one of the most frequent shrubs. From Africa we have seen specimens from several places on the Nubian Coast and the islands near, from Abyssinia both from the coast and inland hills, and from Somali-land. In the latter country, according to Hildebrandt, it is called "Dossémo" by the natives, and grows at an elevation of 1100—1600 metres. From the Asiatic side, we have specimens from Ghizan on the Red Sea in Arabia collected by Ehrenberg and from the neighbourhood of Aden. Forskal's specimens, merely labelled "ex oriente," are said to have been collected in the province of Yemen in Arabia, and there is abundant evidence to show that the

tree grows in the interior of the latter country. It is not now known to occur in Palestine, and the famous trees of antiquity mentioned in the Scriptures and by old writers may probably have been cultivated there.

From want of satisfactory and complete specimens the species of this genus are in considerable confusion. We agree with Professor Oliver in combining *B. Ehrenbergianum* with the present species; indeed they appear identical. Both Berg and Schweinfurth, however, consider the plants distinct; and the name was bestowed by Berg on the specimens from Ghizan, above noticed, which the collector labelled as certainly the source of myrrh. These were in fruit only. Schweinfurth says that *B. Ehrenbergianum* is confined to Asia.

As understood here there is very little variability in the species, the greater or less pubescence of the usually glabrous leaves, and the occasional production of an extra pair of leaflets being the chief. The flowers appear with the young leaves in February and March, and the fruit is ripe in May and June, by which time the branches are not unfrequently leafless.

In the above description of the fruit and seed we have followed the view commonly held as to the signification of the different parts. The pulpy layer within the epicarp—which seems to have escaped the notice of previous describers of the plant—has a remarkable form, and might be readily taken to be an arillus, were it not for the remains of the second abortive pyrene.

Little or nothing more is known at present (May, 1876) of *B. Myrrha*, Nees, than the poor figure in Nees, t. 357 (a portion of which is reproduced in Pharm. Journ., 1873, p. 822). This also was collected as a myrrh-producing shrub at Ghizan by Ehrenberg in 1820—6. It is said not to be found on the African side of the Red Sea. So far as the description and figure enable us to judge, it must be a very close ally of the Indian *B. Berryi*, Arn. (*Protium gileadense*, W. & A.), if not the same as that species.

Prof. Baillon adopts the name *Balsamea*, Gleditsch, for this genus, the date of which is 1782 (Berlin Gesellsch. Naturforsch.

Freunde, vol. iii, p. 103, t. 3, fig. 2). It does not, however, appear from the description and figure given, that Gleditsch really had this plant under his observation.

Berg, in Bot. Zeitung, 1862, p. 163; Oliver, Fl. Trop. Africa, i, p. 326; Schweinfurth, in Petermann, Geograph. Mitth., 1868, p. 127; Boiss., Fl. Orient., ii, p. 2; Lindl., Fl. Med., p. 169; D. Hanbury, in Pharm. Journ., April, 1873, p. 821.

Official Part and Name.—MYRRHA; a gum-resinous exudation from the stem of Balsamodendron Myrrha, *Ehrenb.* (B. P.). The gum-resinous exudation from the stem of Balsamodendron Myrrha (I. P.). MYRRHA; a gum-resinous exudation from the stem of Balsamodendron Myrrha (U. S. P.).

It will be noticed that the plant now under description is not the official one of the Pharmacopœias; but in the uncertainty as to the botanical source of myrrh it will be better for us to describe that drug in the present place, although we shall probably figure and describe the so-called *Balsamodendrum Myrrha*, hereafter.

Collection and Commerce.—According to Ehrenberg, myrrh exudes from the bark like cherry-tree gum. It is at first soft, of an oily nature, and of a yellowish-white colour; but it gradually assumes a golden tint, and ultimately, as it hardens, becomes reddish. But Ehrenberg says nothing about the collection of this myrrh by the natives, although he describes it as of good quality; and it is now certain that the myrrh of commerce is not brought from the country about Gison or Ghizan, in Arabia, on the eastern shore of the Red Sea, which was the district visited by Ehrenberg. Indeed, at the present time, it would appear, from information obtained from Vaughan, Harris, Cruttenden, and others, that true myrrh is not obtained in Arabia at all, but from Africa, and that it is chiefly, if not entirely, collected in the Somali country and the districts around Harar or Hurrur. From these parts it is brought to the great fair of Berbera, where it is purchased by the Banians of India, and forwarded to Bombay. From recent information communicated to the Pharmaceutical Journal by Dr. Dymock, it would

appear that the bags or bales which contain the myrrh when opened in Bombay, are found to be made up of myrrh of various qualities, mixed with another allied gum-resin, which is probably, according to Dymock, the *opaque bdellium* of Guibourt; it is termed in the local markets *meena hărma*, true myrrh being distinguished under the name of *kărăm*. In Bombay the contents of the package are sorted, the myrrh being separated from the bdellium, and then the best myrrh is picked out and forwarded to Europe; the darker pieces constitute myrrh of second quality; and the refuse is exported to China. Nearly all the myrrh used in Europe and elsewhere, is obtained from Bombay. In the year 1872—73 the exports amounted to 546 cwt., of which 493 cwt. were forwarded to the United Kingdom.

General Characters and Composition.—Myrrh is in irregular roundish pieces, varying in size from small grains up to that of a hen's egg, or rarely, as large, or even larger, than a man's fist. The pieces either consist of distinct tears, or are agglutinated masses of tears. Externally, the masses of myrrh have an opaque appearance, a reddish-brown or reddish-yellow colour, and are covered by a fine powder. They are brittle, and when broken the fractured surface presents an irregular, somewhat translucent, rich brown, moist, and oily appearance; and in many cases exhibits opaque whitish spaces or striæ, which the ancients compared to the white marks at the base of the finger-nails. The odour of myrrh is peculiar, aromatic, and agreeable; the taste bitter, aromatic, and acrid. The finer pieces are sold as *picked myrrh*, and were formerly distinguished as *Turkey myrrh*.

Myrrh is essentially composed of *gum*, *resin*, and *volatile oil*. It is only partially soluble in water, alcohol, or chloroform; the first liquid taking up the gum principally, and the two latter the resin and oil. When triturated with water myrrh forms a brownish-white milky emulsion. The *gum*, which resembles gum arabic, although not altogether identical with it, constitutes on an average from 40 to 50 per cent., but sometimes over 60 per cent. The *volatile oil*, which may be readily obtained by the distillation of myrrh with water, is a yellowish, somewhat viscid liquid, with

a powerful odour of myrrh, and having a specific gravity, according to Flückiger and Hanbury, of 0·988, but Gladstone found it to be heavier than water. The amount of oil obtainable has been variously estimated at from ¾ to over 3 per cent. The *resin* is readily soluble in alcohol or chloroform, but only partially soluble in alkalies or bisulphide of carbon; its amount probably averages about 25 per cent, but it has been found by different chemists to vary from 23 to 44 per cent. When first moistened by alcohol, and then by hydrochloric acid, the resin assumes a violet hue.

Adulterations and other Kinds of Myrrh.—The inferior qualities of myrrh are often adulterated with various gums, resins, &c. These may be usually distinguished by the transparency of their fractured surface, and by their deficiencies of odour and taste; they are fully described in special treatises on the Materia Medica, and need no further mention from us. But besides the true myrrh, as hitherto described, there are two other varieties of myrrh, which we must briefly refer to. These are commonly distinguished under the names of *Arabian Myrrh* and *East Indian Myrrh*. Both varieties are frequently sold by dealers as true myrrh.

1. *Arabian Myrrh.* This is collected to the eastward of Aden, in Southern Arabia, and is probably the produce of a species of *Balsamodendrum* closely allied to that from which the true or African Myrrh is derived. It is forwarded from Makulla and Aden to Bombay, where its trade name is *meetiga*; it is mostly sold in India as true myrrh. It occurs in irregular gummy-looking masses, the largest which are formed by the agglutination of small, shiny, translucent tears, rarely exceeding 1½ inches in length. It is more brittle than true myrrh, and when broken, although its fractured surface much resembles that drug, the whitish opaque markings so characteristic of it are absent. Arabian myrrh is also more gummy than African myrrh, but it possesses a similar taste and odour.

2. *East Indian Myrrh,* the *Bissa Bôl* of the Arabs. This is collected like true myrrh in the Somali country, and is also doubtless the produce of a species of *Balsamodendrum,* allied to

that from which the true myrrh is derived. It is forwarded to Aden, Makulla, and other ports of Arabia, &c., and thence to India and China, where it is chiefly consumed. When of good quality it closely resembles true myrrh in its external characters, but its odour, which has been compared to that of mushrooms, at once distinguishes it. As usually seen it is generally regarded as a very inferior dark-coloured kind of myrrh.

Medical Properties and Uses.—Myrrh is a stimulant tonic, and expectorant, and is also commonly regarded as possessing anti-spasmodic and emmenagogue properties. When combined with iron and aloes, myrrh is a remedy of great value in amenorrhœa. It is also frequently administered in leucorrhœa and chlorosis; and occasionally, with benefit, in chronic bronchitis, phthisis, and atonic dyspepsia. Locally applied it is a useful stimulant in spongy gums, the aphthous sore mouths of children, and various kinds of indolent ulcers.

Besides its use in medicine, myrrh has been employed from the earliest times as an ingredient in incense and perfumes, &c. It entered into the composition of the holy oil in use by the Jews; and also into the *Kyphi* of the Egyptians, which was used in fumigations, and for embalming, &c.

Balm of Gilead.—The oleo-resin known under the names of Balm or Balsam of Gilead, Balm of Mecca, and Opobalsamum, which is supposed to be the Balm of the Old Testament, is said by some authors to be the produce of Balsamodendrum Opobalsamum. Balsam of Gilead is a whitish, viscid, turbid liquid, of an agreeable odour when fresh, but it thickens by age and becomes of a yellow colour. Its use has become obsolete in Europe, although formerly the most wonderful properties were attributed to it. But it is still esteemed in the East for its fragrance and medicinal properties.

Stacte or Liquid Myrrh.—We have no positive evidence of the source of the *liquid myrrh* or *stacte* of the ancients, but it is said by Pliny to be a spontaneous liquid exudation of the myrrh tree, of even more value than myrrh itself. Formerly, it was obtainable in large quantities, but, as stated by Flückiger and

Hanbury, no drug of modern times has been identified with it. Stacte entered into the composition of the holy incense in use by the Jews.

Genesis xxxvii, 25; Exodus xxx, 23 and 34; Solomon's Song iii, 6; Jeremiah viii, 22.

Per. Mat. Med., by B. & R., p. 872; Pharmacographia, p. 124; U. S. Disp., by W. & B., p. 571; Pharm. Journ., 1 ser., vol. xii, p. 226, vol. iii, 3rd ser., p. 821, and vol. vi, 3rd ser., p. 661; Ann. de Chimie, vol. lxvii, p. 72; Archiv der Pharm., vol. lxi, p. 1, and vol. xliii, p. 304; Am. Journ. of Pharm., vol. xviii, p. 228.

DESCRIPTION OF PLATE.

Drawn from specimens in the British Museum, collected in Nubia and Abyssinia by Schweinfurth.

1. Branch of a male plant in flower.
2. Vertical section of a male flower.
3. Branch with fruit.
4. A fruit.
5. Transverse, and—6. Vertical section of fruit.
7. Fruit with the epicarp removed, showing the aril-like mesocarp (?).
8. Portion of an old branch with young shoots of the year.

(2, 4–6 enlarged.)

D.Blair ad nat. del et lith.

M&N.Hanhart imp.

EXOGONIUM PURGA, *Benth.*

N. Ord. CONVOLVULACEÆ.

Genus Exogonium,* *Choisy*. Choisy, in DC. Prod., ix, pp. 346-7. Species 8 or more, natives of the W. Indies and tropical America.

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186. Exogonium Purga,† *Benth., Plant. Hartweg., p.* 46 (1839).

Jalap.

Syn.—Ipomæa Purga, *Hayne*. I. Jalapa, *Nutt.* (non *Pursh*). Convolvulus Purga, *Wenderoth*. C. Jalapa, *Schiede* (non *Linn.*).

Figures.—Nees, Supp.; Hayne, xii. tt. 33, 34; Berg & Sch., t. 5 a, b; Bot. Mag., t. 4280; Zuccarini, Pl. Nov., fasc. i, t. 12.

Description.—An herbaceous perennial twiner. Stems numerous, slender, twisted and furrowed, twining, smooth, purplish, reaching 12 feet or more in length, moderately branched, arising from the crown of fleshy tubercular roots, which are nearly globular, tapering below into a fibrous termination, reaching the size of an orange or small turnip but usually smaller, brown and finely mottled or spotted externally, white within. Leaves alternate, without stipules, on thick stalks nearly as long as themselves, 4 or 5 inches long, deeply cordate at the base with pointed lobes, attenuated at the apex, quite entire, smooth on both surfaces, paler below, veiny. Flowers in small axillary cymes usually of 3 flowers, on long wiry twisted peduncles, pedicels with small bracts at base, about half an inch long, thickened upwards. Calyx short, ovoid, smooth, cut into 5 oblong, blunt, imbricate segments, the two outer shorter, margins membranous. Corolla large, salver-shaped, glabrous, the tube about 2 inches long, slender, slightly wider above, again contracted where it joins the limb, which is nearly horizontal, about 2½ inches across, somewhat undulated, of 5 broad truncate segments scarcely separated by a faint notch, and marked down the centre by a tapering band, twisted in æstivation, deep, dull, purplish-pink. Stamens 5, inserted near

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* *Exogonium*, from the stamens projecting out of the corolla.

† *Purga*, the Spanish name of the drug, from its action.

the base of the tube, filaments somewhat flattened, 3 longer than the other two, all somewhat exserted beyond the throat of the corolla and towards one side, anthers small, introrse. Ovary tapering into the slender style which extends a very little beyond the stamens, 2-celled, surrounded by an annular disk; stigma of two rounded papillose lobes; ovules 2 in each shell. Fruit not seen.

Habitat.—This grows in damp, rich, shady woods in the mountainous country near Jalapa* in West Mexico, at an elevation of about 6000 feet above sea level. It was introduced into the Edinburgh Botanic garden in 1838, and is now to be met with pretty generally. As an ornamental plant it has considerable claims to notice, being easily propagated and flowering in the open air with but slight shelter from September till checked by the first frosts. It is not, however, able to ripen its fruit here, nor have we met with any description of it. The tubercles are hypertrophied roots, and are usually accompanied by ordinary fibrous ones and often by some intermediate in character. Subterranean white horizontal shoots are also given off from the crown of the tubercles.

Choisy, the monographer of the *Convolvulaceæ*, places this in *Ipomœa*, but the long corolla tube and exserted stamens are at variance with the characters of that genus as given by him.

D. Hanbury has described and figured (Journ. Linn. Soc., Bot. xi, p. 279, t. 2), under the name of *Ipomœa simulans*, the plant which yields the Jalap of Tampico, a coast town of Mexico, north of Jalapa. Another sort called Orizaba root, from the place of that name, is the produce of *I. orizabensis*, Ledanois.

Choisy, in DC. Prod., ix, p. 374; Balfour, in Bot. Mag., t. 4280 Lindl., Fl. Med., p. 396.

Official Part and Name.—JALAPA; the dried tubercules (B. P.). The dried tubercules (*Jalapa*) (I. P.). JALAPA; the tuber (U. S. P.).

Collection and Commerce.—In Mexico, whence the official jalap is obtained, the tubercules are dug up, to some extent, during the

* Whence the drug gets its name of Jalap.

whole year; but principally in the spring when the young shoots begin to appear. The roots (tubercules) are then placed in nets, and dried by the aid of fire heat. The smaller tubercules are dried entire; but the larger ones are more or less incised to facilitate desiccation, or cut into halves or quarters, or rarely into transverse slices, for the same purpose.

Jalap is imported from Vera Cruz, and the average imports into the United Kingdom may be estimated at about 180,000 lbs.

General Characters and Composition.—When entire, the tubercules are usually irregularly roundish or somewhat ovoid, rarely they are fusiform or even cylindrical; they vary commonly in size from a hazel-nut to that of a hen's egg, but sometimes they are as large as a man's fist, or even larger. The large tubercules are generally marked with the circular or transverse incisions, made as noticed above, to facilitate their drying. Externally they have a dark brown colour, and are more or less deeply furrowed, contorted, and wrinkled, or rarely they are nearly smooth. Internally their colour is dirty yellowish or brownish, and marked frequently with darker brown irregularly concentric rings. They have a faint, peculiar, somewhat nauseous odour, which is increased by rubbing or powdering them; and a nauseous, sweetish, subsequently acrid taste. Good jalap is hard, heavy, plump, and resinous; the light, whitish, amylaceous, shrivelled, or woody pieces, are of inferior quality. The powder of jalap is of a yellowish-grey colour.

The activity of jalap is due to a *resin,* which is official in the British Pharmacopœia and in the Pharmacopœias of India and the United States.. The amount of resin has been variously estimated at from 11 to 21 per cent. Among other constituents of jalap, are *sugar, starch, gum,* and *colouring matter.* From this crude resin which is obtained from jalap by spirit of wine, two resins may be extracted, one which is *soluble in ether,* and which constitutes from 5 to 8 per cent. of its substance, or, according to Umney, 12 per cent.; and another forming the residue, which is *insoluble in ether,* and which has been termed *Convolvulin,* or formerly by Pereira *Jalapin,* but this latter name, as will be presently

mentioned, is now applied to a resin which *is soluble in ether.* Convolvulin is a glucoside, being resolvable by moderate heating with emulsin, or dilute acid, into *sugar,* and a crystallizable substance called *Convolvulinol.* Convolvulin when pure is colourless, and readily dissolves in alcohol or the fixed alkalies; but is insoluble in ether, or ammonia, or in oil of turpentine.

Adulterations and Substitutions.—In consequence of the increased demand for official jalap combined with a falling off in the supply from its original source, jalap has of late years been frequently adulterated by being intermixed with the roots of other plants, but the characters given above of true jalap are such as will readily distinguish it. The roots of two plants which are extensively used as adulterants of, or substitutes for, the official jalap, require, however, some notice from us; these are *Tampico Jalap* and *Woody Jalap.*

1. *Tampico Jalap,* as its name implies, is imported from Tampico, a port to the north of Vera Cruz, in the Gulf of Mexico. Hanbury traced its botanical source to *Ipomœa simulans.* Tampico jalap agrees with true jalap in odour and taste, and pieces may be found which also resemble it in other respects, but it may be generally distinguished from the genuine drug by its more shrivelled appearance, lighter weight, smaller size, and more elongated and tapering form. Tampico jalap yields from 10 to 15 per cent. of a *resin,* which in its pure state is entirely *soluble in ether.* This resin therefore differs from *Convolvulin,* the principal constituent of crude jalap resin, which is *insoluble in ether.* Tampico jalap is generally regarded as inferior in medicinal activity to the official jalap, but we have no very accurate information on this point. It is imported in large quantities into this country and elsewhere.

2. *Woody Jalap* or *Orizaba Root,* or as it is also termed *Light, Fusiform,* or *Male Jalap,* or *Jalap Tops* or *Stalks;* is derived from the neighbourhood of Orizaba, and its botanical source is *Ipomœa orizabensis,* Ledanois. It is generally found in irregular, angular or circular pieces, which are clearly portions of a large root; or sometimes the smaller roots are found entire, and are

then fusiform. It is readily distinguished from true jalap by its paler colour and more woody character; it is also commonly more shrivelled and of lighter weight. Its essential constituent is a *resin*, to which the name of *Jalapin* has been unfortunately given, and which may be obtained from it to the extent of about 12 per cent. When pure Jalapin is colourless, amorphous, translucent, and *perfectly soluble in ether*, by which it differs from *Convolvulin*. It is regarded by chemists as identical with scammony resin, and hence, probably this kind of jalap is but little, if at all inferior, as a medicinal agent, to that of true jalap.

Medical Properties and Uses.—Jalap is a certain, powerful, and speedy drastic purgative, causing copious watery stools. It is less irritant than gamboge, podophyllum, or even scammony; but it occasionally causes griping, aud sometimes nausea and vomiting. It is frequently given to children as a vermifuge, on account of its little taste, and generally safe action. It is a valuable purgative in habitual constipation, and in febrile and inflammatory affections, especially when combined with aromatics which diminish the griping; it is also given as a hydragogue in dropsies, as a derivative purgative in head affections, and in other cases.

Per. Mat. Med., vol. ii, pt. 1, p. 614; Per. Mat. Med., by B. & R., p. 634; Pharmacographia, p. 399; U. S. Disp., by W. & B., p. 501; Guibourt, Histoire des Drogues (1869), vol. ii, p. 523, Gmelin's Chem., vol. xvi, pp. 154 & 159; Hanbury, in Journ. Linn. Soc. Bot. (1871), p. 279; Umney, in Pharm. Jl., vol. ix, 2nd ser., p. 282; Evans, in Pharm. Jl., vol. ix, 2nd ser., p. 330; Squibb, in Amer. Journ. of Pharm., Jan., 1868, pp. 65-6; Amer. Journ. of Pharm., vol. ii, p. 22, and vol. x, p. 224; Watts' Dict. Chem. vol. ii, p. 15.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Royal Gardens, Kew, flowering in September.

1. Part of stem, with flowers and leaves.
2. Vertical, and—3. Transverse section of ovary.
4. Stigma.
5. Base of the stem and tubercular roots.

煙草

D. Blair ad viv. del? et lith.

NICOTIANA TABACUM, L.

M & N. Hanhart imp.

N. Ord. SOLANACEÆ.

Tribe *Nicotianeæ*.

Genus Nicotiana,* *Linn.* Dunal, in DC. Prod., xiii, sect. i, pp. 556–572. Species about 60, natives of tropical America, the Pacific Islands, and Australia.

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191. Nicotiana Tabacum,† *Linn., Sp. Plant, ed.* i, *p.* 180 (1753).

Tobacco. Cultivated Tobacco. Virginian Tobacco.

Syn.—Nicotiana macrophylla, *Lehm.* N. auriculata, *Bert.?*

Figures.—Woodville, t. 77; Bigelow, t. 40; Steph. & Ch., t. 37; Nees, t. 194; Hayne, xii, t. 41; Berg. & Sch., t. 12 d; Nees, Gen. Fl. Germ.

Description.—A coarse robust annual, reaching 6 feet high, with a long tapering root. Stem erect, unbranched, cylindrical, solid, green, thickly set with soft viscid hairs. Leaves alternate, numerous, the lower ones very large, reaching as much as 2 feet in length, shortly stalked, ovate-lanceolate or ovate, the upper ones smaller, more or less amplexicaul at the base, rather variable in form, oval-oblong or lanceolate or somewhat obovate, all acute, quite entire, somewhat waved, covered with viscid hairs, and some small sessile glands, bright green, paler beneath, midrib thick, lateral veins curved at the margin. Inflorescence a terminal, rounded or oval panicle, with a few short branches; flowers not numerous, spreading horizontally, shortly stalked; bracts linear. Calyx tubular, somewhat inflated, green, cut half way down into 5 narrow-lanceolate acute segments, viscid-hairy. Corolla 1¾—2 inches long, tubular, the tube inflated in its upper half, smooth within, pale greenish-yellow, finely glandular-hairy outside, the limb spreading, cut into 5 broadly triangular pointed lobes, dull pink or red, plicate in the

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* So called in the 16th century, in honour of Jean Nicot, French ambassador at Lisbon, who in 1560 brought the plant thence into France.

† *Tabacum*, a Latin form of Tobacco, which is said to be originally a native word meaning the pipe or tube used in smoking by the Indians.

bud. Stamens 5, inserted in the base of the corolla, filaments about the length of the tube, one usually shorter than the rest, anthers small, oblong. Ovary smooth, conical, 2-celled, style about as long as stamens, slender, stigma bilobed. Capsule barely an inch long, often shorter, ovate in outline, the lower half closely covered by the dry persistent calyx, pericarp thin, papery, veined, splitting septicidally into 2 valves, which again are partially split from the top, 2-celled, placentas axile, large, spongy. Seeds minute, very numerous, somewhat irregular in form, oblong, ovoid, or sub-reniform, pale brown, the testa marked with a raised reticulation of large pattern with sinuous meshes; embryo slightly curved in axis of endosperm.

Habitat.—There is no doubt that the tobacco is a native of some part of South or Central America, but the precise country of its origin cannot now be determined. Martius considered it introduced in Brazil, and it is nowhere known in a truly wild state.

The plant was first grown in Europe at Lisbon in 1560, the dried leaves and the practice of smoking having been introduced nearly a century before by the Spaniards. In nearly all temperate and warm countries of both hemispheres, the culture of tobacco is now carried on; it grows well in England, into which country it was introduced before 1570, and is now frequently employed as an ornamental plant in gardens, but except in very small quantity it has been, since 1660, illegal to cultivate it for use; the statute then passed for the benefit of the "American Colonies" being still unrepealed. It flowers freely from late summer till the middle of September.

Many varieties are recognised by cultivators, the principal characters being found in the form of the leaves, and colour and size of the flowers. The remarkable *N. fruticosa,* Linn., lately figured (Bot. Mag. 6207) as a variety of the present species, is a very handsome plant, and differs especially in its sharp-pointed capsules: there are good specimens in the British Museum, one from Teneriffe.

Dunal, in DC., l. c., p. 557; Bigelow, Amer. Med. Bot., ii, p. 171;

De Candolle, Géogr. Bot., ii, p. 848; Lindl., Med. Bot., p. 513; Pritzel, Thesaurus Literat. Bot., ed. 1, p. 457.

Official Part and Names.—TABACI FOLIA; the dried leaves of Virginian Tobacco (B. P.). The dried leaves (*Tabaci Folia*) (I. P.). TABACUM; the commercial dried leaves (U. S. P.).

Preparation, Kinds of Tobacco, and Commerce.—In America, from which our official tobacco leaves are directed to be obtained, the tobacco harvest takes place in August, when the plants are regarded as ripe. At this period the stems are cut off from the plants just above their roots, and then hung up in the drying houses, where they are exposed to a considerable degree of heat, and during this process of curing, as it is termed, they become moist, or in other words, are said to sweat. They are then further dried and stripped of their leaves; and the latter are then tied in bundles, and packed for exportation, &c. In the process of preparation tobacco leaves appear to undergo a kind of fermentation by which important chemical changes take place in their composition, one of the most evident being the formation of some new volatile principle, for the heavy narcotic odour of the dried leaves is wanting in the fresh ones.

In commerce two states of tobacco are distinguished, in one of which it is termed *unmanufactured* or *leaf tobacco*, in the other *manufactured tobacco*. In the British Pharmacopœia the dried leaves of Virginian tobacco, or unmanufactured tobacco, cultivated in America, are alone official. Under the head of manufactured tobacco are included the different forms of tobacco prepared for chewing and smoking, and for taking as snuff. The description of the numerous forms and varieties of manufactured tobacco does not come within our province.

Besides Virginian tobacco, which is derived, as we have seen, from *Nicotiana Tabacum*, the plant now under notice, other commercial kinds from the same plant are also obtained from the United States of America, as Maryland, Kentucky, &c. By far the greater proportion of unmanufactured tobacco imported into the United Kingdom is from the United States. Professor Thiselton Dyer has also just proved that Latakia Tobacco, which

has hitherto been always supposed to be derived from *N. rustica*, L., is prepared from the flowering panicles and even the capsules of *N. Tabacum*, and that its peculiar flavour is due to being smoked for some months in the smoke of the wood of *Pinus halepensis*. The other principal kinds of tobacco are the Shiraz or Persian from *Nicotiana persica*, Lindl.; East Indian, Manilla, and Turkish, from *N. rustica*, L.; and Cuba and Havannah from *N. repanda*, Willd.

The consumption of tobacco in this country has very much increased of late years. Thus in the year 1841 the quantity of tobacco cleared for home consumption amounted to $8\frac{3}{4}$ oz. per head of population. In 1851 the amount had increased to 1 lb. $0\frac{1}{4}$ oz. per head; in 1861 to 1 lb. $3\frac{1}{2}$ oz.; in 1865 to 1lb. 5 oz.; and in the year 1874 to nearly $1\frac{1}{2}$ lbs. per head of population of the United Kingdom. Thus in the year 1874 no less than 45,253,303 lbs. of unmanufactured tobacco were retained for home consumption, and of manufactured cigars and snuff, 1,280,154 lbs., the whole representing a money value of about £1,600,000; and the duty paid on this amounted to £7,500,000 sterling. The total annual production of tobacco over the whole globe is probably not less than 3,000,000 of tons.

General Characters and Composition.—The characters of leaf tobacco are thus given in the British Pharmacopœia:—Large mottled brown ovate or lanceolate acuminate leaves, bearing numerous short glandular hairs; having a peculiar heavy odour and nauseous bitter acrid taste; yielding when distilled with solution of potash, an alkaline fluid, which has the peculiar odour of nicotia, and precipitates with perchloride of platinum and tincture of galls.

The active principle of tobacco is a volatile alkaloid termed *Nicotia* or *Nicotine*. Virginian tobacco in the dried state contains a varying preparation of nicotia, but probably on an average, about 6 per cent. Nicotia is also generally said to be present in tobacco smoke, but this is denied by Vohl and Eulenberg. Nicotia is a colourless, oily, volatile, inflammable, powerfully alkaline liquid, of sp. gr. 1·048 at 60°, boils at 482°, and has an acrid odour, and a burning taste. It is very soluble in water, the fixed

oils, alcohol, and ether; and by exposure to air and light it quickly assumes a brown colour.

By distillation with water, tobacco leaves yield a concrete volatile oil, which has been termed *Nicotianin* or *Tobacco Camphor*, which is tasteless, crystalline, and with a tobacco-like smell. The other constituents of tobacco leaves are *albumin*, *resin*, *gum*, and from 16 to 27 per cent. of *inorganic matters*. As in the process of smoking, the albuminous, resinous, and gummy principles of the leaves, as well as the cellulose of the thick midrib, produce unpleasant products, the manufacturer endeavours to get rid of these by taking out the midrib, and by subsequent preparation to destroy as far as possible these constituents, and cause the development of aromatic ferment-oils.

Medical Properties and Uses.—The alkaloid nicotia is a most energetic poison. As a medicine, tobacco leaf owes its value to its powerfully sedative and antispasmodic properties. In over doses it acts as an acro-narcotic poison. It especially affects the action of the heart; and on account of the dangerous depression sometimes produced by its administration, it is, as a general rule, but little employed as an internal remedy. It has been given, however, in tetanus, dropsical affections, spasmodic asthma, spasmodic colic, retention of urine; and as a means of inducing muscular relaxation, and thus assisting in the reduction of strangulated hernia, and dislocations; but in the latter conditions its use has been now superseded by that of chloroform. Topically, it has been employed in a variety of skin diseases, &c.; and in the form of snuff it has been prescribed as an errhine in head affections, and to arouse the respiratory functions in poisoning by opium and hydrocyanic acid; also in the form of smoke, in asthma, spasmodic coughs, nervous irritability, and sleeplessness. In prescribing tobacco, it should be ascertained whether the patient is in the habit of smoking, snuff-taking, &c., as a dose which might scarcely affect one person, might seriously affect another; for, like opium, a tolerance of tobacco is established by its use.

The enormous consumption of tobacco is, of course, not as a medicine, but in the various modes of smoking, snuffing, and

chewing, which are in common use in nearly every part of the globe. In habitual smokers, the practice, when employed moderately, produces a remarkably soothing and tranquillising effect on the mind, which has made it so much esteemed and employed by all classes of society, and by all nations, civilised and barbarous; and such high authorities as Pereira and Christison say that they are not acquainted with any well-ascertained ill-effects resulting from the habitual practice of smoking in moderation. But when indulged in to "excess, it enfeebles digestion, produces emaciation and general debility, and lays the foundation of serious nervous disorders"; and, according to some practitioners, it also then produces mental affections resembling delirium tremens and insanity.

Per. Mat. Med., vol. ii, pt. 1, p. 569; Pharmacographia, p. 420; U. S. Disp., by W. & B., p. 851; Garr., Mat. Med., p. 330; Royle, Mat. Med., by J. Harley, p. 482; Watts, Dict. Chem., vol. iv, p. 44; Journ. de Pharm., vol. xxii, p. 689; Taylor, in Pharm. Journ., vol. xviii, 1st ser., p. 620; Proc. Amer. Pharm. Assoc., 1858, p. 300, and 1865; Johnston, Chemistry of Common Life, vol. ii, p. 6.

DESCRIPTION OF PLATE.

Drawn from a specimen grown in the Garden of the Apothecaries' Company, Chelsea.

1. Summit of stem with inflorescence.
2. Corolla split open.
3. Capsule with persistent calyx.
4. A seed.
5. Section of the same.

(4, 5 greatly enlarged.)

D. Blair ad nat. del. et lith.

RICINUS C

MUNIS, *Linn.*

M. & N. Hannart imp

N. Ord. EUPHORBIACEÆ.

Tribe *Acalypheæ*.

Genus Ricinus,* *Linn.* Müll. Arg. in DC. Prod., xv, pt. 2, pp. 1016-21; Baill., Hist. Pl., v, p. 109. Species a single very variable one.

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237. Ricinus communis, *Linn., Sp. Plant. ed.* 1, *p.* 1007 (1753).

Palma-Christi. Castor Oil.

Syn.—R. europæus, *Nees.* R. lævis, *DC.* R. viridis, *Willd.* R. lividus, *Jacq.* R. africanus, *Mill.* &c. &c.

Figures.—Woodville, t. 221; Nees, t. 140; Hayne, x, t. 48; Steph. & Ch., t. 50; Berg & Sch., t. 1 c; Flora Græca, t. 952; Nees, Gen. Fl. Germ.; Baill., l. c., f. 153–162.

Description.—Very variable in habit and appearance; in tropical countries a tree reaching 40 feet high, in warm, temperate regions a slender, woody, branching bush of 12—14 feet, in this country a very large branched, annual herb 4 or 5 feet high; herbaceous stems hollow, smooth, cylindrical, glaucous, with a purplish bloom in the upper part. Leaves alternate, on long, curved, cylindrical, purplish petioles, sub-peltate, drooping, stipules large, ovate, yellowish, united into a cap enclosing the buds, deciduous, blade 6—8 inches across, palmately cut for three quarters of its depth into 7—11 lanceolate, acute, coarsely serrate segments, smooth, blue-green, paler beneath, red and shining when young. Flowers monœcious, large, arranged on the thick rachis of an oblong, spicate panicle, which is at first terminal but becomes lateral by the growth of an axillary bud beneath it; male flowers shortly stalked, on branched peduncles at the base of the panicle, pedicels articulated about the middle; female flowers sessile, at the upper part; bracts broadly triangular. Male flowers: Calyx deeply cut into 3—5 smooth, broadly ovate, pointed segments, valvate in æstivation; petals none; stamens very numerous, irregularly combined into many much branched, compound stamens,

* *Ricinus*, a dog-tick, from the form of the seed; the plant was called κίκι and κροτών by the Greeks, the latter word having the same meaning.

inserted on the raised centre of the receptacle, anthers small, 2-celled, dehiscing longitudinally. Female flowers: Calyx as in the male, but more deeply cut, with the segments narrower, more acute and erect; petals none; ovary shorter than the calyx, superior, globular-trigonous, with the blunt angles bearing several lines of large, soft, erect, finger-shaped prominences, tipped with a transparent spiny bristle, 3-celled, with a single ovule attached to the top of the axis in each cell, style very deeply divided into three long, flattened branches, each split into two, the inner surface covered with papillæ, bright carmine-red. Fruit a blunt, greenish, deeply-grooved, tricoccous capsule, less than an inch long, with the prominences of the ovary become sharp, weak, spreading spines, 3-celled, dehiscing loculicidally and septicidally into 6 valves. Seeds ovoid, flattened, nearly $\frac{5}{8}$ inch long by $\frac{1}{4}$ broad, smooth, shining, pinkish-grey, prettily mottled with dark brown, caruncle large, subglobular, raphe faintly raised, running down centre of ventral surface, embryo large in axis of the endosperm, cotyledons foliaceous, broadly ovate, with a cordate base, veined.

Habitat.—It is believed that this well-known plant is a native of India, and that it has spread thence over all the warmer countries of the world. In the Mediterranean region, especially in Spain and Sicily, where it occurs as a bush or small tree, it has quite the look of a native plant. It is cultivated for medicinal purposes in India, Italy, and other countries; in England it is only grown as a garden ornament and is an annual. The known varieties are very numerous, and have mostly been described as species. Müller groups them in one species under 16, distinguished by the varying size and form of the capsules and seeds; the colour of the latter varies also considerably, and the spines on the capsule are sometimes quite absent.

The name "Castor" was originally applied to this plant in Jamaica, where it seems to have been called "Agnus Castus," though it bears no resemblance to the South European plant properly so named (*Vitex Agnus-Castus*, L.).

Müll. Arg. in DC., l. c., p. 1017; Lindl., Fl. Med., p. 183; Pappe,

Fl. Cap. Med. Prodr., p. 37; Gris, in Ann. des Sc. Naturelles, ser. 4, xv, p. 5.

Official Parts and Names.—Oleum Ricini; the oil expressed from the seeds (B. P.). The seeds (*Ricini Semina*) (I. P.). Oleum Ricini; the fixed oil obtained from the seed (U. S. P.).

1. The Seeds.—The seeds are oval, somewhat compressed, convex on one side, and with two flattish surfaces on the other; varying in length from about $\frac{1}{3}$ to over $\frac{1}{2}$ an inch, and in breadth from $\frac{1}{4}$ to $\frac{4}{10}$ of an inch, and about $\frac{1}{8}$ of an inch thick; ordinarily they may be described as being about the size of a coffee grain, or small bean. In India two varieties of the seed are distinguished, the large and the small; the latter being usually considered to yield the better product. A fleshy, tumid process, termed a caruncule or strophiole, is situated at one end of the seed, or if this is broken off, a blackish scar remains. Externally, the seeds are very smooth and shining, and of a greyish colour, marbled with brownish or blackish bands and spots, of various tints and shapes, so as to give the seeds a great variety of appearances. In one hundred parts of castor oil seeds Geiger found, exclusive of moisture, 23·82 parts of seed-coats, and 69·09 of nucleus or kernel, which is of a whitish colour. The seed-coats are without taste or odour; but if not rancid, the nucleus has a bland sweetish taste, succeeded by a very slight degree of acridity.

The principal constituent of the nucleus is the fixed oil, commonly called Castor Oil, which is described below. The seeds are only official in the Pharmacopœia of India as the source of the oil; of which the nucleus yields from about 40 to 50 per cent. The other constituents of the seeds are, about 20 per cent. of *albuminoid matters*, 2·2 of *sugar* and *mucilage*, and about 18 per cent. of *cellulose*. Professor Tuson has also indicated the presence of a crystalline alkaloid, which he has named *Ricinine*, but his results have been called in question by Werner, and recently by E. S. Wayne, of Cincinnati; he still, however, maintains the correctness of his conclusions. The seeds are also supposed to contain a very small portion of some acrid purgative principle; but this matter has not been isolated. But a small proportion of this purgative principle is contained in the castor oil as ordinarily

obtained by expression, for the oil obtained by absolute alcohol from castor oil seeds, as well as the seeds themselves, or an emulsion prepared with them, have a far more powerful purgative action than the expressed oil.

2. Oleum Ricini. *Castor Oil.—Production, Varieties, and Commerce.* Castor oil may be obtained from the seeds in three ways :— 1. by decoction ; 2. by expression ; and 3. by some solvent, as alcohol. All the oil, however, now consumed in England, India, and the United States ; and with few exceptions, in other parts of the world, is obtained by expression. All processes in which a high temperature is employed are considered objectionable from increasing the acridity of the oil. In India, in order to extract the oil, the seeds are first gently crushed between rollers, and after the seed coats or husks, and unsound seeds, have been removed by hand-picking, the cleaned kernels are submitted to pressure in an hydraulic press ; and the oil thus obtained is first heated with water until the water boils, by which the albuminous matters are separated as a scum ; and the oil is then finally strained through flannel. In the north of Italy, more especially about Verona, the fresh seeds are alone used, and after the seeds have been broken and their integuments very carefully removed with a winnowing machine and by the hand, the blanched seeds are put into small hempen bags, which are arranged in superposed layers in a powerful hydraulic press with a sheet of iron heated to 90° between each layer, so as to enable the oil to flow readily ; they are lastly submitted to pressure in a room, which in the winter is heated to a temperature of about 70°. The oil which first flows is of the finest quality ; but an inferior oil is subsequently obtained by pressing the marc at a somewhat higher temperature.

By somewhat modified processes good castor oil is also obtained in this country and in the United States ; but in the West Indies it is prepared by boiling the crushed seeds after depriving them of their integuments, in water, and afterwards separating the oil by skimming or straining. The oil thus extracted is very inferior to that obtained by expression, as before described.

General Characters and Composition.—Good commercial castor oil has a viscid consistence, and a specific gravity of about 0·96. It is colourless, or pale straw-yellow; with scarcely any odour, and a mild, somewhat unpleasant taste, which is succeeded by a very slight acridity. Inferior oils have a brownish colour, a nauseous odour, and a disagreeable acrid taste. Castor oil is especially distinguished by its ready solubility in absolute alcohol and in glacial acetic acid; it is also soluble in about two volumes of rectified spirit. It does not generally solidify until about 0°; and when exposed to the air in thin layers, it slowly dries up to a varnish, and hence it belongs to the class of drying oils.

When saponified, castor oil yields several fatty acids, one of which is supposed to be *palmitic acid*, and another, which is peculiar to castor oil, is termed *Ricinoleic acid.*

Medical Properties and Uses.—Castor oil is a mild and most efficient purgative, and is well adapted for infants and young children, the puerperal state, and in irritable conditions of the alimentary canal or of the genito-urinary organs. It is one of the safest and most reliable purgatives we possess for the relief of obstinate constipation. It has also been strongly recommended by Dr. Johnson as an eliminant in malignant cholera, and has the high authority of Sir Thomas Watson and numerous other practitioners in its favour.

In India, Algeria, &c., castor oil has been used for burning in lamps, and the inferior qualities are also employed in India for soap-making.

Formerly the seeds were employed as a purgative, but on account of their violent action, they are not now administered.

The leaves have been also recommended in the form of a decoction or poultice, as an application to the breasts of women to increase the secretion of milk. The decoction has also been reputed to act as a lactagogue and emmenagogue when administered internally.

Per. Mat. Med., by B. & R., p. 531; Pharmacographia, p. 512; U. S. Disp., by W. & B., p. 609; Gmelin's Chemistry, vol. xvii (1866), p. 131; Groves, in Pharm. Journ., vol. viii, 2nd ser., p. 250; Amer. Journ. Pharm., vol. xxvi, p. 207, and vol. xxvii,

p. 99; Chemical News, vol. xxii (1870), p. 229; Pharmacopœia of India, pp. 201 and 462.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Garden of the Apothecaries' Company, Chelsea, flowering in September.

1. A flowering top.
2. Section of male flower.
3. A group of united stamens.
4. A female flower.
5. Vertical, and—6. Transverse section of ovary.
7. Fruit.
8. Seed.
9. Vertical, and—10. Transverse section of the same.

(2–6 enlarged.)

D.Blair, ad nat. del. et lith.

M&N.Hanhart imp.

PINUS LARIX, *Linn.*

N. Ord. CONIFERÆ.
Tribe *Pineæ*.
Genus Pinus, *Linn.*

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260. Pinus Larix,* *Linn., Sp. Plant. ed.* 1, *p.* 1001 (1753).

Larch.

Syn.—Abies Larix, *Lam.* Larix europæa, *DC.* L. decidua, *Miller.*

Figures.—Woodville, t. 4; Nees, t. 84; Berg & Sch., t. 11 b; Reichenb., Ic. Fl. Germ., xi, t. 531; Nees, Gen. Fl. Germ.; Lambert, Ill. Gen. Pinus, ed. 3, t. 48.

Description.—A tall tree, reaching 80 feet or more in height, with a straight trunk and spreading whorled branches, the smaller branchlets slender and elegantly pendent; bark flaky, whitish- or pinkish-grey, rosy-red beneath. Leaves deciduous, appearing in spring in spreading brush-like tufts, each containing numerous (30—40) leaves, from perennial permanent rounded buds projecting horizontally from the slender branchlets with a cup-shaped mouth; when full grown about an inch long, linear, rather blunt, entire, smooth, bright green. Fls. monœcious. Male catkins sessile, ovoid, reaching ½ inch long, surrounded at the base by a cup formed of persistent adnate bracts, and by some inner deciduous, reflexed, fringed, brown scales; stamens numerous, crowded, anthers almost sessile on the thick central column, with a short recurved crest at the summit, 2-celled, opening longitudinally, pollen globose, pale yellow. Female cones shortly stalked, ¾ inch long, erect, ovoid, surrounded at the base with spreading linear leaves; bracts membranaceous, oblong or oval, blunt with a sharp central point, bright dark pink, the midrib and point green; carpellary scales not ⅓ the length of the bracts, and adnate to their base, rounded; ovules 2, inverse, bottle-shaped, with a large papillose mouth. Ripe cones erect, light, 1 or 1¼ inch long, broadly ovoid, pale greyish-brown, axis solid and woody, carpellary scales hard,

* *Larix*, Pliny, from λάρικα, the name of the resin in the time of Dioscorides.

woody, and tough, greatly enlarged to twice the length of the bracts, orbicular, striate, spreading, somewhat wavy at the margin where they become thin. Seeds 2, in the hollowed-out base of each scale, somewhat triangular, with a large thin wing, straight along inner margin, and rounded on the outer, embryo straight in axis of the endosperm, polycotyledonous.

Habitat.—This well-known tree forms extensive woods in the mountain regions of Central Europe, where it ascends to an altitude of over 5000 feet above the sea: in the Apennines it is always a cultivated tree. In this country the Larch is largely grown in plantations, and is very ornamental in the spring, the young leaves being of an intensely bright green. It flowers in April and May.

Parlatore, in DC., l. c., p. 411; Loudon, Arboret. Brit., iv, p. 2350; Lindl., Fl. Med., p. 554.

Official Part and Name.—LARICIS CORTEX; the bark, deprived of its outer layer, of Larix europæa, *DC.* (B. P. *Additions*, 1874). It is not official in either the Pharmacopœia of India, or the Pharmacopœia of the United States.

Preparation.—Larch bark should be obtained in spring; and after the external rough portion has been removed, the remainder, consisting of the inner bark, middle bark, and a variable portion of the outer bark, should be quickly dried. This constitutes the official bark of the British Pharmacopœia.

General Characters and Composition.—Larch bark is generally found in flattish pieces, or sometimes in quills. The pieces and quills vary much in length and thickness. The outer surface has a dark red or rosy colour, with frequently intervening whitish portions of liber, and presents a more or less uneven character; the inner surface is smooth, yellowish-white in colour in the larger pieces, and pinkish-red in the smaller quills, and may be readily separated into layers. Larch bark breaks with a close fracture, except as regards the liber, which is somewhat tough and fibrous; and the fractured surface, except that of the liber, has a deep carmine-red colour. It has a slightly balsamic terebinthinous odour; and an astringent taste.

The principal constituents of larch bark are *tannic acid*, a volatile crystallizable principle called *larixin* or *larixinic acid*, and a little *turpentine*, which is described below.

Medical Properties and Uses.—Larch bark is regarded as stimulant, astringent, and diuretic, and is supposed to have a direct tendency to the mucous membranes. It has been especially recommended as an internal remedy to check profuse passive expectoration in cases of chronic bronchitis; in hæmoptysis, and other forms of internal hæmorrhage; and in cystitis and purpura. It has also been used as an external application in chronic eczema, psoriasis, and some other cutaneous affections.

Besides its medical properties, larch bark is sometimes used in tanning.

Other Products of the Larch Tree.—A kind of turpentine which is commonly known as *Larch* or *Venice Turpentine*, is obtained as follows:—In the spring a narrow hole is bored to the centre of the stem of the larch tree, at about a foot from the ground; the hole is then stopped up, and in the autumn of the same or following year, the oleo-resin which has then exuded, is collected with an iron spoon. It is chiefly contained in the heart-wood, and is principally obtained in the Tyrol; but occasionally in parts of Switzerland, Piedmont, and France.

Venice turpentine is a thick, honey-like, slightly turbid fluid. It has a pale yellowish colour; an odour which resembles common turpentine, but weaker and not so agreeable; and an aromatic, somewhat acrid, bitter taste. It thickens but very slowly when exposed to the air, and does not harden when mixed with magnesia. It dissolves entirely in alcohol. It consists of *volatile oil* and *resin*.

Venice turpentine is common on the Continent, but that sold in England and in the United States, is almost always spurious; being a mixture of common resin and oil of turpentine; and distinguished readily from the genuine drug by its stronger turpentine odour, and by drying into a hard varnish when spread out on a piece of paper.

Its properties and uses appear to be the same as other

turpentines. It is not now used in this country, except in veterinary practice.

The substance called *Briançon Manna*, or *Manna of the Larch*, also exudes in the height of the summer from the leaves of the larch tree. It is a white saccharine substance, occurring in small, opaque, sometimes crystalline, usually oblong tears, enclosing the needle-like leaves; and without any very marked odour, but having a sweet taste. It contains a peculiar sugar called *Melezitose*. It was formerly used in medicine, but has now disappeared from commerce.

Per. Mat. Med., by B. & R., p. 1070; Pharmacographia, pp. 373, 549, and 551; U. S. Disp., by W. & B., p. 863; Stenhouse, in Phil. Trans., vol. clii (1862), p. 53; Mohl, in Botanische Zeitung (1859), p. 329; Greenhow, in Medical Times, Feb. 20, 1864; Dublin Hosp. Gaz., April 15, 1858, and Jan. 15, 1859; Amer. Journ. Pharm., Jan., 1859, p. 61, and Nov., 1862, p. 555; Guibourt, in Journ. de Pharm., vol. xxv, p. 500.

DESCRIPTION OF PLATE.

Drawn from a tree in Kew Gardens in April.

1. A branch, with cones and male and female flowers.
2. A male catkin.
3. Section of the same.
4. A stamen.
5. Section of female cone.
6. A bract, with the carpellary scale and ovules.
7. Upper view of ripe scale with the two seeds.
8. Outer view of same.
9. A seed.
10. Section of the same.

(2–10 enlarged.)

D. Blair ad nat del et lith.

M&N Hanhart imp

CANNA EDULIS, *Ker.*

N. Ord. CANNACEÆ.

Genus Canna,* *Linn.* Bouché, in Linnæa, xviii, p. 483. Species about 60 or more, natives chiefly of the tropical and warmer parts of America.

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266. Canna edulis, *Ker, in Bot. Register,* ix, t. 775 (1823).

Achira (Peru). *Meeru* (Brazil).

Syn.—C. indica, *Ruiz & Pav.* (non *Linn.*). C. discolor, *Lindl.?*

Figures.—Bot. Reg., t. 775 and ? 1231; Bot. Mag., t. 2498; Roscoe, Scitamineæ, 5th plate.

Description.—An herbaceous perennial with a large, creeping, fleshy, branched, definite rhizome, with thick, nodular, tuberiform joints, ringed with the brown fibrous remains of the leaves of previous years. Roots long, cylindrical, rather thick, unbranched, fibrous. Flowering stems terminal, erect, 8 feet high, somewhat compressed, smooth, solid, green, triangular in the upper part. Leaves very large, alternate, lower ones on long stalks, upper ones sheathing, broadly oval- or ovate-oblong, attenuate at both ends, smooth, bluish-green, with a broad strong midrib, and numerous, curved, parallel, prominent, secondary nerves. Flowers few, in pairs, nearly sessile, erect, arranged in a rather close, short, racemose inflorescence at the end of the stem; a single bract below each pair of flowers, ovate, blunt, membranous and crumpled, purplish-pink, persistent, and two small opposite ones below the ovary of one of the flowers. Sepals 3, superior, slightly unequal, ovate, blunt, imbricate, greenish. Petals 3, superior, alternate with the sepals, and three times as long as them, erect, lanceolate, concave, very acute, red. Androœcium of 5 superior petaloid staminodes exceeding the true petals, and appearing to constitute the corolla, imbricated in (irregularly) 2 rows, unequal, bright scarlet, yellowish below; the 3 outer at the back of the flower, erect, the longest nearly 3 inches long, all oblong-spathulate, blunt, entire; the 2 inner dissimilar, one curved over the front of the flower, forming a sort of lip, and internally constituting the floor of the flower,

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* *Canna,* Greek κάννα, a reed or cane.

the other bearing an anther on one side in contact (in the bud) with the front of the style, round which this staminode is folded, the upper part recurved, the base fused with the posterior surface of the style; anther apparently 1-celled, dehiscing down the centre, pollen yellowish-white. Ovary inferior, oblong-ovoid, green, papillose, 3-celled, with numerous axile ovules in two rows in each cell; style 2¼ inches long, horizontally flattened, sub-petaloid, scarlet, erect in the posterior part of the flower; stigma terminal, truncate, linear. Fruit, a roundish capsule about ½ inch long, crowned with the withered remains of the flower, pericarp thin, membranous, greyish-brown, muricated with deciduous filiform processes, dehiscing loculicidally into 3 valves. Seeds several, nearly globular, dark brown; testa thin, marked with minute distant punctuations; embryo club-shaped, the narrower radicle at the hilum in contact with the testa and covered for a short way down with a sheath prolonged from the inner seed-coat.

Habitat.—*C. edulis* is cultivated in Peru, where it was originally observed by Ruiz and Pavon; it was first grown in England in 1823 from seed collected by them 30 years before. It is also supposed to be the species cultivated in the West Indian Islands (especially St. Kitts) for the starch of its rhizomes, but this has not been made out with certainty.

The species of *Canna* have been as yet little studied, and their limits are ill-defined; they are also said to vary much under cultivation. The plant figured and above described has been grown at Chelsea Gardens under the above name for many years, but it cannot be said to agree well with the authentic specimens of *C. edulis* in the Lambertian herbarium (now in the British Museum). These have smaller (and paler?) flowers and narrower staminodes, the bracts are much larger, and the habit of the plant more slender. We have not, however, been able to refer the Chelsea Gardens plant with more certainty to any other described species, though *C. Lamberti* Lindl. (figured in Bot. Reg. t. 470, and Roscoe's 2nd plate) appears to have several characters in common with it.

Ruiz & Pavon, Fl. Peruviana, i, p. 1; Roscoe, Scitamineæ;

Botanical Register, vii, Appendix; Grisebach, Fl. Brit. W. Indies, p. 603; Lindl., Fl. Med., p. 570.

Official Part and Name.—CANNA; the fecula prepared from the rhizome of an undetermined species of Canna (U. S. P.). It is not official in either the British Pharmacopœia, or the Pharmacopœia of India.

This starch is commonly known under the name of Tous les Mois. It is principally imported from St. Kitts, but nothing is known of its botanical source, except that it is derived from one or more species of Canna.

Extraction.—In order to extract the starch, the rhizomes or tubers are first rasped by means of a machine into a pulp; and from this pulp the starch is obtained by washing, straining, decantation of the supernatant liquor, and desiccation of the deposited starch.

General Characters and Composition.—*Canna starch* or *Tous les Mois*, as seen by the naked eye, is a white powder, having a peculiar satiny or glistening appearance on account of the large size of its constituent granules. The sparkling or glistening appearance of the granules is very obvious when viewed by a magnifying lens. When examined by the compound microscope the granules are seen to be very large, exceeding in this respect all other known starches, being from the 200th to the 300th of an inch in length. They have a somewhat flattened appearance, and an ovate or oblong form; the hilum, which is not very conspicuous, is at one end of the granule, and is encircled with numerous, regular, distinct, unequally distant rings.

Tous les Mois has the same composition as that of other starches.

Medical Properties and Uses.—Tous les Mois has all the properties of starch, and is nutritious and demulcent. It may be used as a demulcent in urinary and bowel complaints. It affords, when boiled with twenty times its weight of water, a more tenacious jelly than that of West Indian Arrow-root or Maranta Starch, and is well adapted to form a wholesome and nutritious food for infants,

convalescents, and invalids. It is, however, but little used in this country, or elsewhere.

Per. Mat. Med., by B. & R., p. 450; Pharmacographia, p. 573; U. S. Disp., by W. & B., p. 208.

DESCRIPTION OF PLATE.

Drawn from a specimen in the Garden of the Apothecaries' Company, Chelsea, in flower in September.

1. Inflorescence.
2. Vertical section of flower.
3. Transverse section of ovary.
4. Ripe fruit.
5. Seed.
6. Section of the same.
7. Embryo.
8. Diagram of flower.
9. Rhizome.

(3 enlarged.)

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